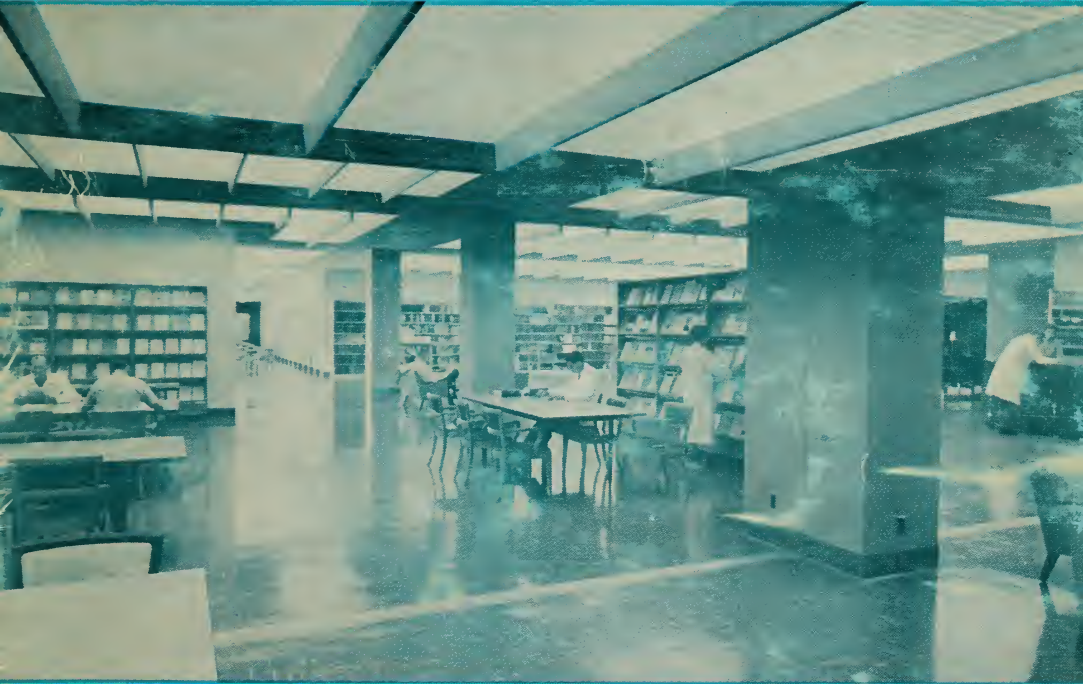


L. Musgrave

The Graduate School



ANNOUNCEMENTS
1963-64



West Virginia University Bulletin

YEAR 1963

JANUARY							FEBRUARY							MARCH							APRIL							
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YEAR 1964

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27	28	29	30					25	26	27	28	29	30	31	29	30						27	28	29	30	31		

ON THE COVER

A scene in the Medical Center Library. Other collections are in the General Library, the Agricultural-Engineering Library, and the Law Library. All of the holdings are available to graduate students for research work.

ANNOUNCEMENTS OF

THE GRADUATE SCHOOL

1963-64 SESSION



WEST VIRGINIA UNIVERSITY BULLETIN

West Virginia University

MORGANTOWN

ESTABLISHED FEBRUARY 7, 1867

The Board of Governors

	TERM EXPIRES
JAMES H. SWADLEY, JR., <i>President</i> , Keyser	1967
WILLIAM G. THOMPSON, <i>Vice-President</i> , Montgomery	1964
CHARLES C. WISE, JR., <i>Secretary</i> , Charleston	1969
FRANK J. ZSOLDOS, Pineville	1963
RAYMOND E. SALVATI, Huntington	1965
FORREST H. KIRKPATRICK, Wheeling	1966
OKEY B. GLENN, Williamson	1968
CYRUS S. KUMP, Elkins	1970
K. DOUGLAS BOWERS, Beckley	1971
PAUL AUSBORN MILLER, <i>Chief Executive Officer</i> , Morgantown	

The Board of Governors has charge of the educational, administrative, financial, and business affairs of the University and Potomac State College of West Virginia University.

West Virginia University Bulletin

Series 63, No. 6-4, December, 1962

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Issued Monthly

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UNIVERSITY CALENDAR

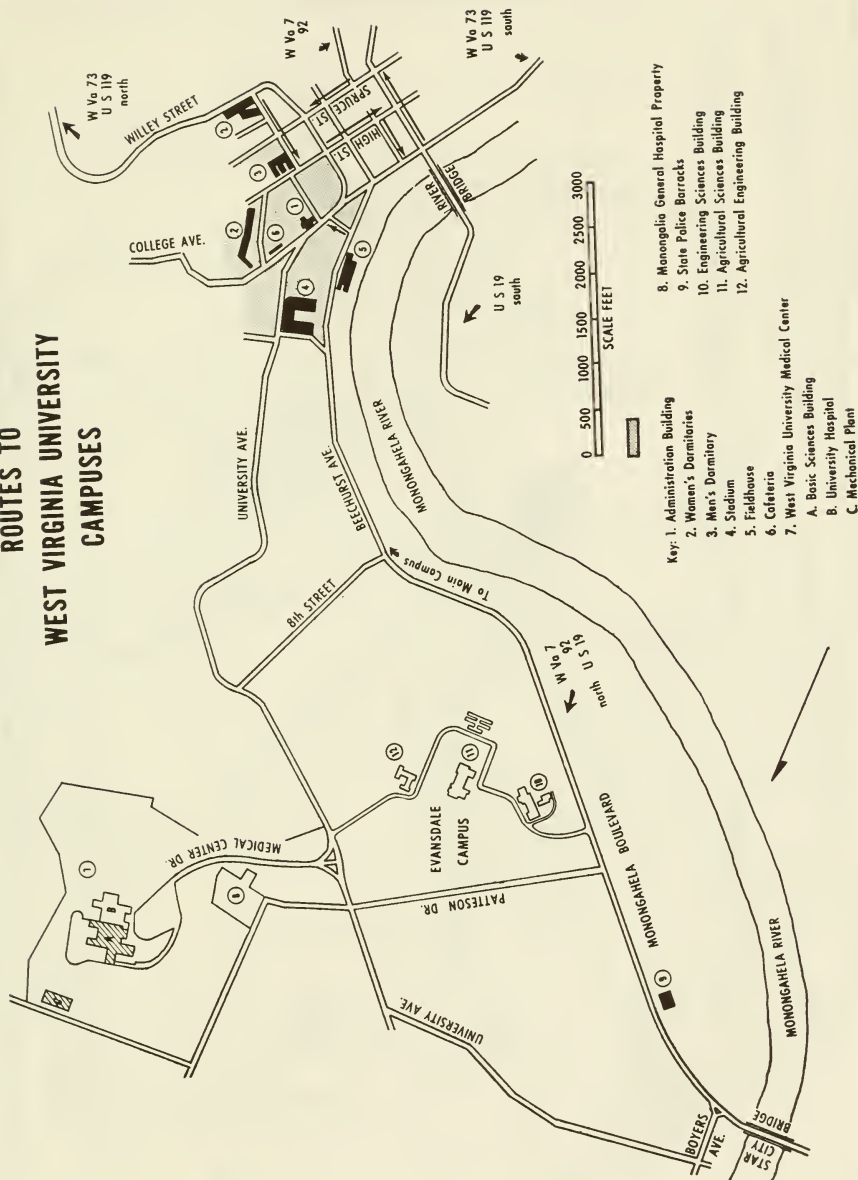
1963

June 1, Saturday	Alumni Day
June 2, Sunday	Baccalaureate Exercises
June 3, Monday	Commencement
June 10, Monday	Registration for First Term, Summer Session
June 11, Tuesday	First Classes, First Term, Summer Session
July 4, Thursday	Classes will meet on Independence Day
July 17, Wednesday	English Proficiency Examination
July 19, Friday	Close of First Term, Summer Session
July 20, Saturday	Registration for Second Term, Summer Session
July 22, Monday	First Classes, Second Term, Summer Session
August 22, Thursday	Close of Second Term, Summer Session
September 9, Monday, to September 15, Sunday, incl.	Freshman Week Program
September 13, Friday, and September 14, Sat.	General Registration, First Semester
September 16, Monday	First Classes, First Semester
October 8, Tuesday	Meeting of University Senate
October 10, Thursday	English Proficiency Examination
November 4, Monday	Mid-Semester Reports Due
November 27, Wednesday, to December 1, Sunday, incl.	Thanksgiving Recess
December 21, Saturday noon, to January 5, Sunday, incl.	Christmas Recess

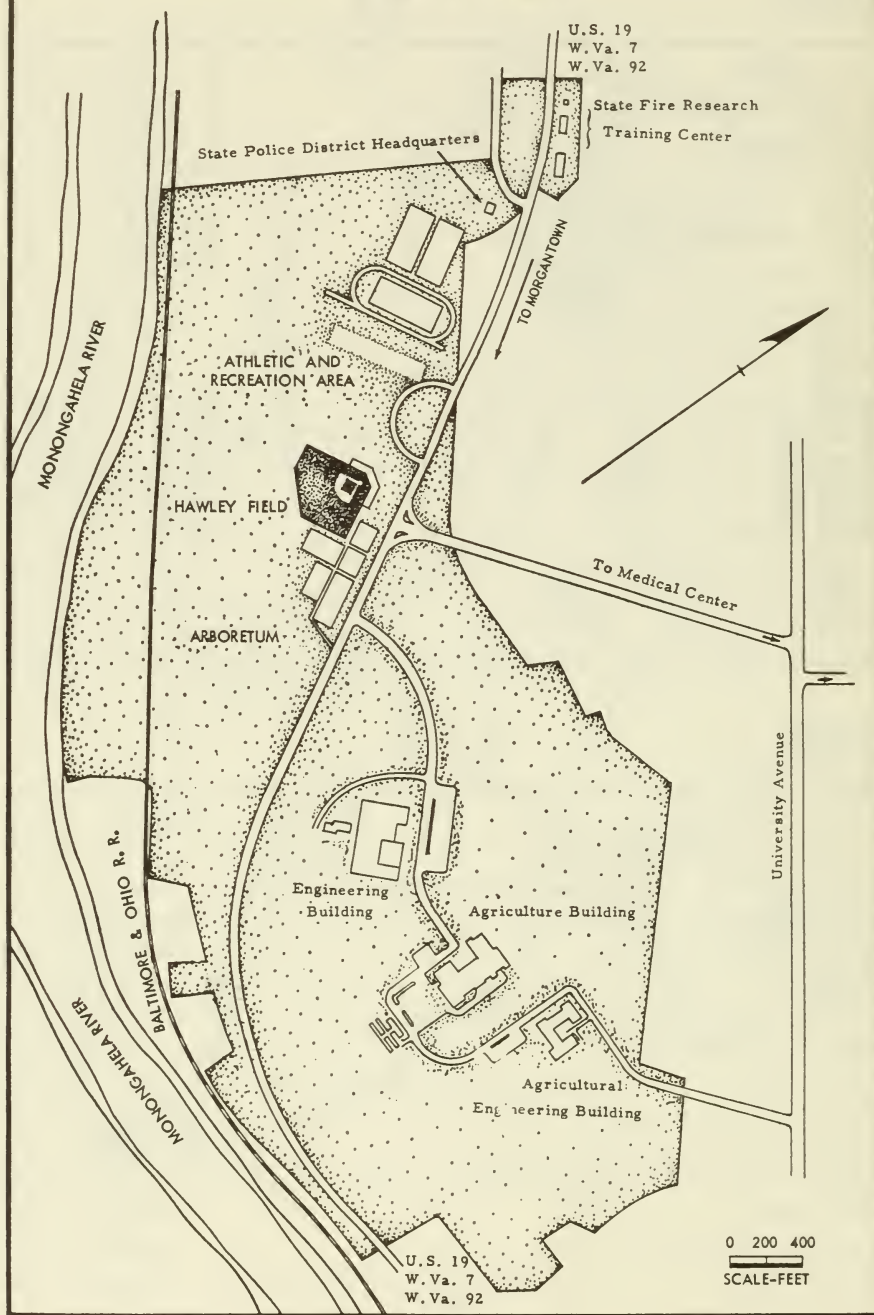
1964

January 18, Saturday	Last Classes, First Semester
January 20, Mon., to January 25, Sat.	Final Examinations for First Semester
January 31, Friday, and February 1, Sat.	General Registration for Second Semester
February 3, Monday	First Classes, Second Semester
February 7, Friday	West Virginia University Day
February 11, Tuesday	Meeting of the University Senate
February 20, Thursday	English Proficiency Examination
March 23, Monday	Mid-Semester Reports Due
March 27, Friday, to April 1, Wednesday, incl.	Easter Recess
May 12, Tuesday	Meeting of University Senate
May 20, Wednesday	Last Classes, Second Semester
May 21, Thurs., to May 27, Wed., incl.	Final Examinations for Second Semester
May 30, Saturday	Alumni Day
May 31, Sunday	Baccalaureate Exercises
June 1, Monday	Commencement

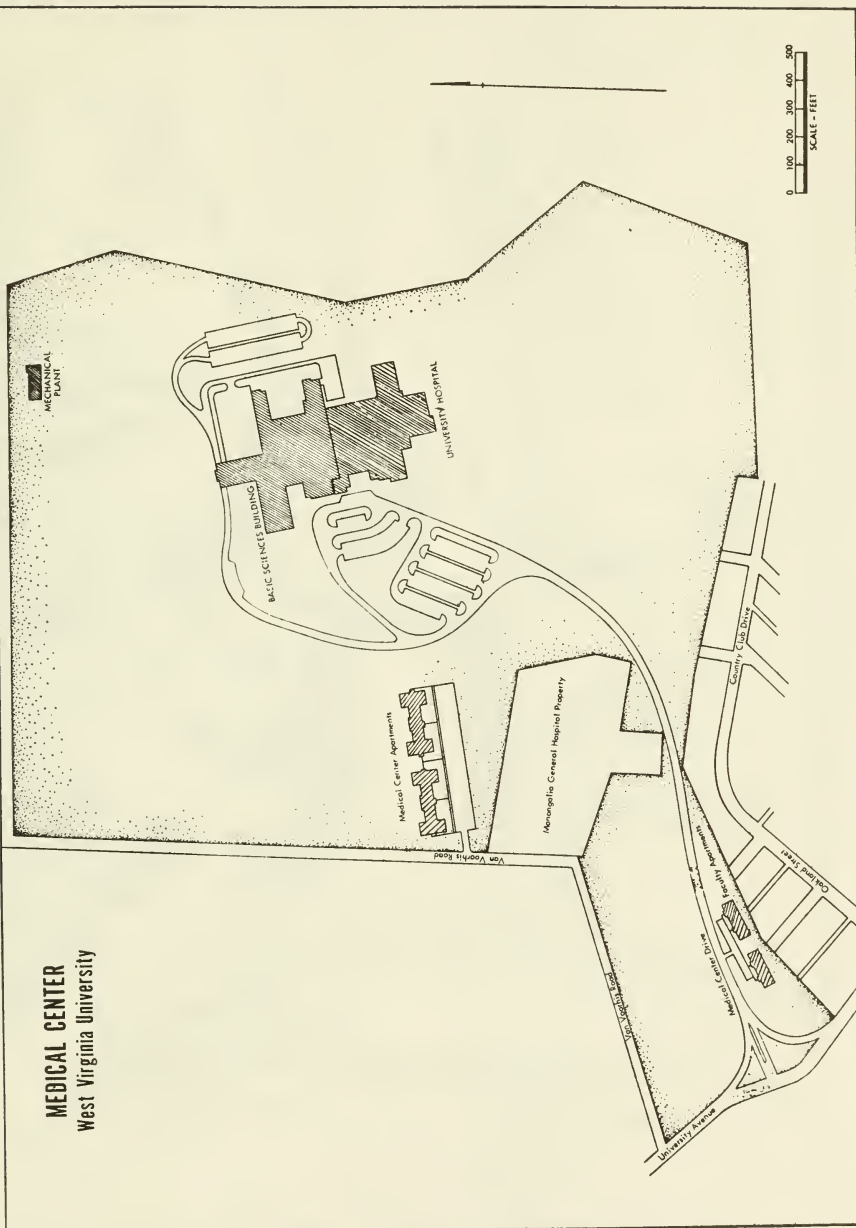
ROUTES TO WEST VIRGINIA UNIVERSITY CAMPUSES



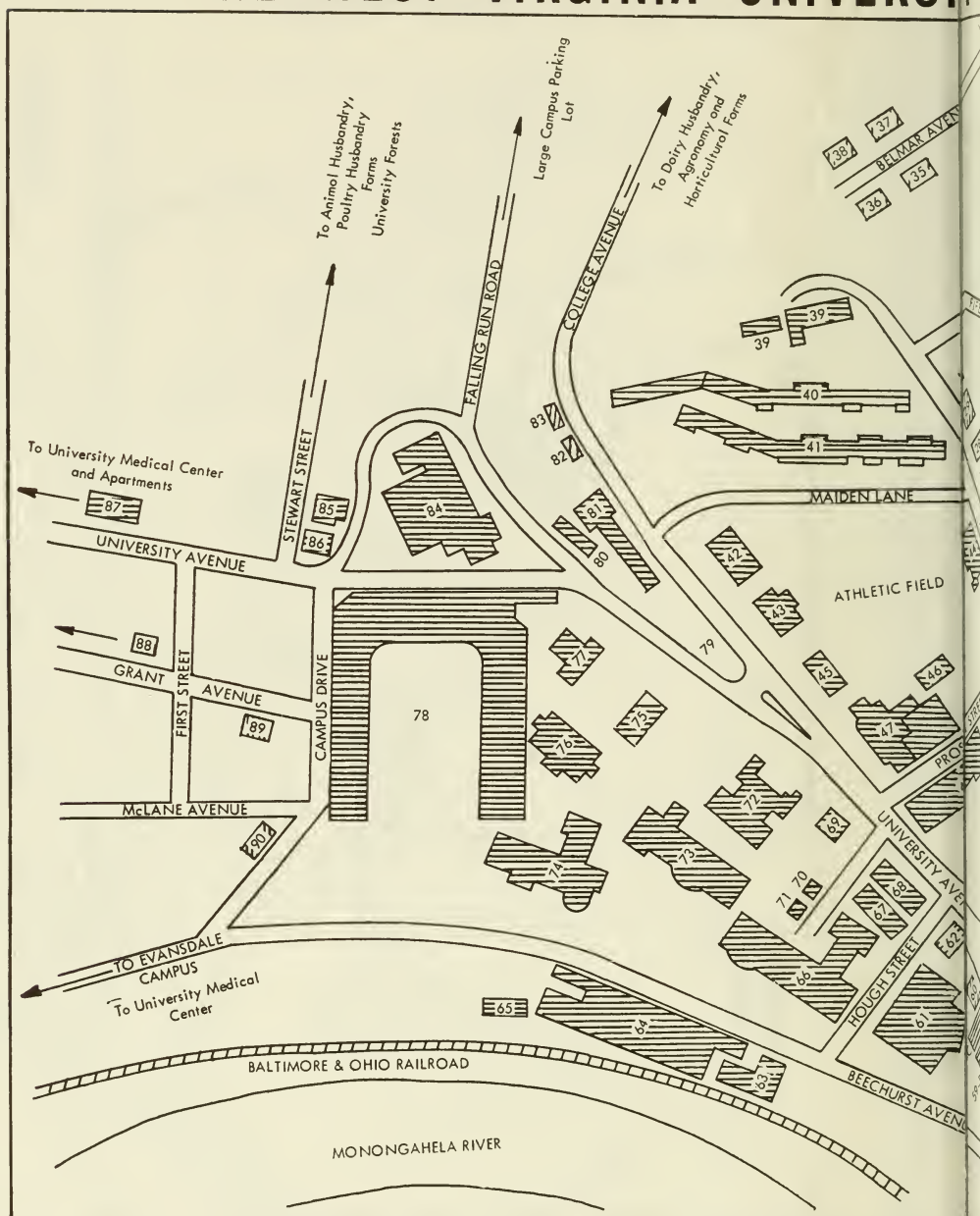
THE EVANSDALE CAMPUS



MEDICAL CENTER West Virginia University



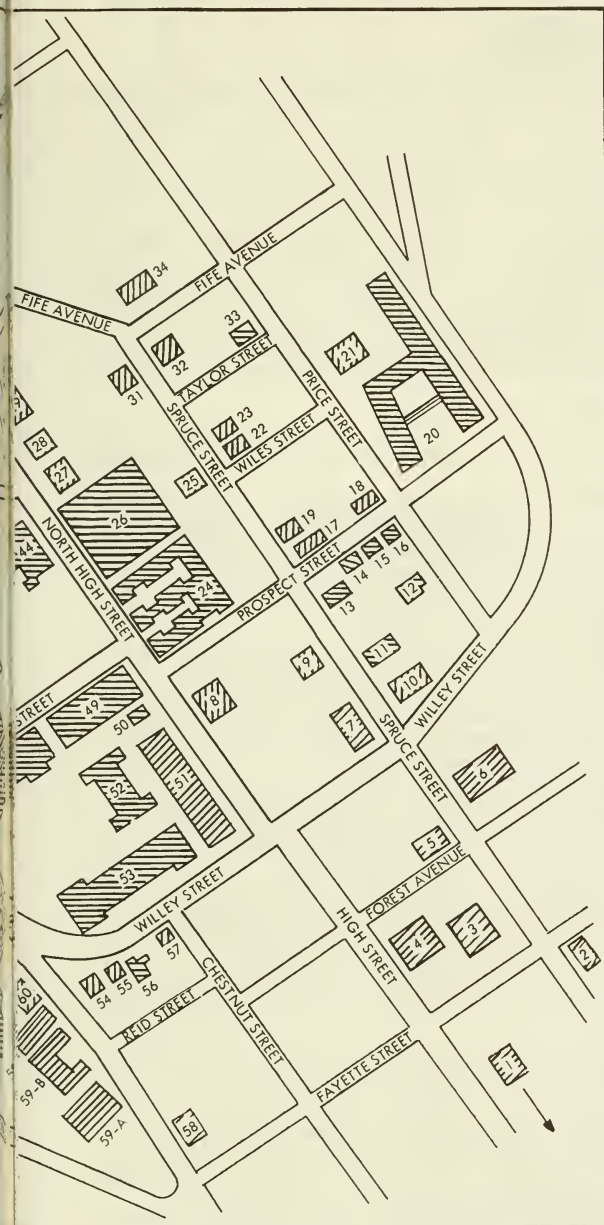
THE WEST VIRGINIA UNIVERSITY



1. Christian Church—Disciples Fellowship
2. Spruce Street Methodist Church
3. Gamma Phi Beta Sorority

4. Baptist Church Student Fellowship
5. Greek Orthodox Church—Greek Orthodox Y. M. C. A.
6. Presbyterian Church—Westminster Foundation

Y MAIN CAMPUS



7. Episcopal Church - Canterbury Association
8. Chi Omega Sorority
9. Phi Kappa Sigma Fraternity

10. Alpha Phi Sorority
11. Spruce Street Annex
12. Nursery School
13. Laurel Cottage
14. 284 Prospect
15. Textiles Laboratory
16. Home Management Apartments
17. Kappa Kappa Gamma Sorority
18. Alpha Delta Pi Sorority
19. Alpha Xi Delta Sorority
20. Arnold Hall
21. Delta Gamma Sorority
22. Delta Delta Delta Sorority
23. Alpha Phi Delta Fraternity
24. Men's Hall
25. Theta Chi Fraternity
26. New Men's Hall
27. Delta Tau Delta Fraternity
28. Kappa Alpha Fraternity
29. Phi Sigma Kappa Fraternity
30. Sigma Chi Fraternity
31. Phi Sigma Delta Fraternity
32. Tau Kappa Epsilon Fraternity
33. Old Agricultural Economics Building No. 2
34. Phi Kappa Psi Fraternity
35. Sigma Nu Fraternity
36. Kappa Sigma Fraternity
37. Beta Theta Pi Fraternity
38. Phi Delta Theta Fraternity
39. Horticulture Greenhouses
40. Terrace Hall
41. Woman's Hall
42. Cafeteria
43. Health Center
44. Armory
45. Reynolds Hall
46. Speech Annex
47. Administration Building
48. Chemistry Building
49. Engineering Building No. 1
50. Glasscock Annex
51. Methodist Church - Wesley Foundation
52. Library
53. Mineral Industries Building
54. Kappa Delta Sorority
55. Sigma Phi Epsilon Fraternity
56. Home Management House
57. Alpha Sigma Phi Fraternity
58. Jewish Youth Center - Hillel Foundation
- 59-A St. Theresa Catholic Church
- 59-B Newman Club (Catholic youth group)
- 59-C St. John's Chapel
60. Pi Beta Phi Sorority
61. Music Building
62. Lutheran Church - Lutheran Student Association
63. Temporary Engineering Building No. 2
64. Field House
65. Heating Plant
66. Physics Building
67. Bookstore
68. Law Building
69. President's Home
70. Counseling Center
71. Placement Office
72. Elizabeth Moore Hall
73. Armstrong Hall
74. Brooks Hall
75. Martin Hall
76. Woodburn Hall
77. Science Hall
78. Mountaineer Field
79. Proposed site, U.S.S. W.Va. Mast
80. Oglebay Hall Annex
81. Oglebay Hall
82. Residence Housing Office
83. 721 College Avenue
84. Mountaineer
85. Plant Pathology Greenhouse
86. Forestry Building
87. Evangelical United Brethren Church - Student Youth Fellowship
88. Alpha Gamma Rho Fraternity
89. Lambda Chi Alpha Fraternity
90. Pi Kappa Alpha Fraternity

ADMINISTRATIVE OFFICERS

GENERAL

President, PAUL AUSBORN MILLER, B.S.AGR., M.A., PH.D., (1962), 1938.
Comptroller and Director of Business Affairs, LOUISE KEENER, B.A., (1954), 1929.
Development, DONOVAN HINER BOND, B.S.J., M.A., *Director*, (1959), 1952.
Libraries, ROBERT FERGUSON MUNN, A.B., M.A., PH.D., *Director*, (1957), 1952.
Provost, JOHN FORD GOLAY, A.B., M.A., D.PHIL.(OXON.), (1961).
Registrar and Chairman of the Committee on Admissions, J. EVERETT LONG, A.B., A.M., (1945), 1929.
Student Affairs, JOSEPH CLAY GLUCK, B.A., B.D., *Director*, (1949), 1943.
Dean of Women, BETTY BOYD, A.B., (1955), 1948.
University Marshal, SAM BOYD, JR., B.F.A., M.F.A., (1959), 1940.

COLLEGES, SCHOOLS, AND DIVISIONS

Agriculture, Forestry, and Home Economics, ERNEST JOSEPH NESIUS, PH.D., *Dean*, (1960).
Agricultural Experiment Station, A. H. VANLANDINGHAM, PH.D., *Director*, (1959), 1929.
Cooperative Extension Service, ERNEST JOSEPH NESIUS, PH.D., *Director*, (1961).
Arts and Sciences, CARL MAYNARD FRASURE, PH.D., *Dean*, (1961), 1927.
Commerce, THOMAS CORWITH CAMPBELL, JR., PH.D., *Acting Dean*, (1961), 1948.
Education, EARL RUFFNER BOGGS, PH.D., *Dean*, (1960).
Engineering, CHESTER ABBO ARENTS, M.E., *Dean*, (1955).
Engineering Experiment Station, WALTER ALLOS KOEHLER, PH.D., *Director*, (1952), 1924.
Extension, University, ERNIE BEVAN McCUE, M.A., *Director*, (1952), 1947.
Graduate, JOHN FORD GOLAY, D.PHIL. (OXON.), *Dean*, (1961).
ROBERT BARCLAY DUSTMAN, PH.D., *Dean Emeritus* (1960), 1924.
Journalism, QUINTUS CHARLES WILSON, PH.D., *Dean*, (1961).
Law, CLYDE LEMUEL COLSON, S.J.D., *Dean*, (1956), 1935.
Medical Center, KENNETH EARL PENROD, PH.D., *Vice President*, (1959).
Dentistry, KENNETH VINCENT RANDOLPH, D.D.S., *Dean*, (1958), 1957.
Medicine, CLARK KENDALL SLEETH, M.D., *Dean*, (1961), 1935.
Nursing, DOROTHY MAE MAJOR, Ed.D., *Dean*, (1960).
Pharmacy, RAPHAEL OTTO BACHMANN, PH.D., *Dean*, (1961).
University Hospital, EUGENE LEO STAPLES, M.S., *Director*, (1960).
Nursing Service, AUDREY EDITH WINDEMUTH, M.S., *Director*, (1960).
Mines, CHARLES THOMAS HOLLAND, M.S.E.M., *Dean*, (1961), 1930.
Music, RICHARD EDWARD DUNCAN, PH.D., *Dean*, (1958).
Physical and Health Education, Recreation, and Safety, RAY OSCAR DUNCAN, Ed.D., *Dean*, (1952).

HEADS OF OTHER ADMINISTRATIVE OFFICES

Book Store, RUTH ELEANOR ROBINSON, A.M., *Manager*, (1944), 1939.
Educational Broadcasting, C. GREGORY VAN CAMP, A.B., *Director*, (1960).
Health Service, JOHN JOSEPH LAWLESS, PH.D., M.D., *Director*, (1944), 1935.
High School, University: DELMAS FERGUSON MILLER, PH.D., *Director*, (1960), 1949.
E. GRANT NINE, M.S., *Principal*, (1960), 1956.
Information and Alumni Secretary, DAVID WOOD JACOBS, A.B., *Director*, (1938).
Intercollegiate Athletics, ROBERT NATHAN BROWN, A.B., *Director*, (1954), 1950.

NOTE: The first date following titles indicates latest appointment. The second date indicates year of first appointment to a University position.

Kanawha Valley Graduate Center of West Virginia University, WALTER HAMILTON WALKER, PH.D., *Director*, (1960).
 Mountainlair, ROBERT F. McWHORTER, M.S., *Director*, (1959).
 Off-Campus Housing, KENNETH W. SHAFFER, M.A., *Adviser*, (1961).
 Parkersburg Branch, West Virginia University, TODD H. BULLARD, M.A., *Resident Director*, (1961), 1956.
 Personnel, THOMAS JOSEPH WALL, M.LITT., *Director*, (1960).
 Physical Plant, CLIFTON WHARTON FLENNIKEN, JR., B.S., *Director*, (1961).
 Placement, MARGARET CORNELIA LADWIG, PH.D., *Adviser*, (1949).
 Residence Halls, AGNES B. HOVEE, M.A., *Director*, (1956), 1950.
 University Editor, JOHN LUCHOK, B.S.J., (1953), 1950.
 Veterans Coordinator and Coordinator of Scholarships, CHARLES J. SHEEHAN, M.A., (1957).

GRADUATE SCHOOL EXECUTIVE COMMITTEE

JOHN FORD GOLAY, D.PHIL.(OXON.), *Chairman*
 JAMES TREAT ANDERSON, PH.D., *Professor of Mechanical Engineering*
 WALTER H. JARECKE, ED.D., *Professor of Education*
 ARTHUR S. PAVLOVIC, PH.D., *Associate Professor of Physics*
 LEROY HALLOWELL SAXE, PH.D., *Associate Professor of Pharmacology*

Part I

GENERAL INFORMATION

HISTORY

West Virginia University was founded as a result of the Congressional Land-Grant (Morrill) Act of July 2, 1862, originally proposed in Congress for the benefit of agriculture and the mechanic arts. The State Legislature accepted conditions of the Act on October 3, 1862. Because of the State's questionable wartime status, the Legislature later specifically requested that the Act's benefits be extended to West Virginia. This was done by Congress on April 19, 1864, with the issuance of 150,000 acres in land scrip for public tracts, principally in Iowa and Minnesota.

The trustees of Monongalia Academy, on January 9, 1866, offered its property to the State, including the site and other property of nearby Woodburn Female Seminary, appraised at \$51,000, on condition that the proposed college "be located permanently at or near Morgantown." The Legislature accepted the offer February 7, 1867, and established the "Agricultural College of West Virginia."

Government and control of the "Agricultural College" were vested in a Board of Visitors composed of one member from each of the State's eleven senatorial districts. In response to requests from President Alexander Martin, the Legislature, by an act of December 4, 1868, changed the name of the "Agricultural College" to "West Virginia University." At the same time the name of the controlling body was changed from "Board of Visitors" to "Board of Regents." Primarily to serve political purposes, the number of regents was changed from time to time until 1919, when government and control were vested in a State Board of Education of five members, including the State superintendent of free schools as the ex officio chairman. This plan was unsatisfactory, and an act of April 14, 1927, vested control of the University's academic matters in a Board of Governors of seven members. In 1947, the Board was increased to nine members, and made responsible for both academic and financial affairs of the University.

Right up to the end of the century, supporters of the institution were divided on whether to work for a "State-supported University," or a "first-class State-supported college." Until the early 1890's the "College Plan" dominated, with "departments" and "schools" functioning autonomously, and with professors generally occupying "chairs" and operating provincially.

But the Hatch Act (1887) and the Second Morrill Act (1890) stimulated more progressive thinking among leaders in higher education. Many of them who were familiar with European systems (including the University's President James L. Goodnight) helped bring the "University Plan" into the ascendancy. In 1895 President Goodnight set out to convert the "University" into just that.

ORIGIN OF THE SCHOOLS AND COLLEGES

The eight Academy Schools, five Technical and Professional Schools, and four Special Courses were organized into four colleges, each with a dean: Arts and Sciences, Powell B. Reynolds; Engineering and Mechanic Arts, William S. Aldrich; Agriculture, John A. Meyers; and Law, Judge Okey Johnson. The School of Music was established in 1897, a "Summer Quarter" or "Continuous Session" in 1898, and a College of Medicine in 1900.

Both the College of Medicine and the Summer Quarter were discontinued in 1901. Beginning in 1897 the College of Arts and Sciences and the College of Engineering and Mechanic Arts functioned without deans and through more or less autonomous departments and schools to 1911 when the deanships were revived. In 1902 a semblance of the "Summer Quarter" was revived in the "Summer School," which in 1932 became the "Summer Session." Alternating between a department and a school organization since 1867, Military Science and Tactics became a division in 1911. The arrangement made in 1903 with the College of Physicians and Surgeons, Baltimore, for maintaining a University College of Medicine proved unsatisfactory. It was discontinued in 1910, and the "Medical Sciences" were offered in a department of the College of Arts and Sciences to 1912 when the School of Medicine was established. In 1914 a Department of Pharmacy was established in the School of Medicine. In the same year the Department of Home Economics, previously a unit in the College of Arts and Sciences, was transferred to the College of Agriculture. The Division of Agricultural Extension was organized in 1912 and the Division of Mining and Industrial Extension in 1914.

The building program inaugurated in 1917 brought additional expansions and curricular offerings. Among the former were the Engineering Experiment Station, 1921, and the School of Mines, 1926, which in 1930 became an independent unit. In 1927 the courses in education were transferred from the College of Arts and Sciences to the newly created College of Education, and in 1928 the Division of Physical Education was established. Offerings were being improved meanwhile through additional and better-qualified personnel. In January, 1930, the Board of Governors established a Graduate School authorized to offer graduate degrees in certain indicated fields.

The Depression (1929-35) slowed expansion somewhat, but progress was resumed in 1936 when the Department of Pharmacy was discontinued as a unit of the School of Medicine and converted to the College of Pharmacy. The next year the Division of Physical Education and the Department of Athletics were combined into the School of Physical Education and Athletics. At the same time (1937), the course in Forestry, begun in 1935 as a two-year curriculum in the College of Agriculture, was expanded to a four-year course, and the name of the sponsoring unit was changed to the College of Agriculture, Forestry, and Home Economics. In 1939 the Department of Journalism was discontinued as a unit in the College of Arts and Sciences and became the School of Journalism. The same year a Department of Art was established in the College of Arts and Sciences. In 1940 the College was further enlarged by the inclusion of a Department of Social Administration, authorized to offer a graduate curriculum leading to the professional Certificate of Social Work. In 1941 the name was changed to the Department of Social Work and in 1944 the Department was authorized to establish an undergraduate curriculum in social work leading to the Bachelor of Science Degree.

In 1950 the Board of Governors authorized the degree of Master of Social Work and approved the establishment of a two-year curriculum leading to that degree. In 1944 a four-year course leading to the B.S. (Medical Technology) Degree was approved to be given jointly by the College of Arts and Sciences and the School of Medicine. In 1948 the Board of Governors approved an order authorizing the College of Arts and Sciences to offer a general course as an integral part of its curriculum and an optional lower-division program of general studies. In 1951, the Department of Economics and Business Administration was discontinued as a unit in the College

of Arts and Sciences and converted into the College of Commerce. In 1953 the School of Dentistry was established. In 1958, the College of Pharmacy was reconverted into the School of Pharmacy, marking the integration of the School into the University's expanding medical sciences program. The University's Kanawha Valley Graduate Center of Science and Engineering was established at Institute, with the first classes beginning in September of 1958. In 1961 it was changed to Kanawha Valley Graduate Center of West Virginia University. In 1960 the School of Physical Education and Athletics was changed to the School of Physical and Health Education, Recreation, and Safety. In 1960 the School of Nursing was established.

PRESIDENTS OF THE UNIVERSITY

The University has had fifteen regular presidents, eleven acting presidents, and one chairman of the faculty. Together with their periods of service, they were Alexander Martin, April 3, 1867-August 12, 1875; Vice-president John Work Scott (acting), September 6, 1875-March 27, 1877; John Rhey Thompson, March 28, 1877-March 12, 1881; Vice-president Daniel Boardman Purinton (acting), March 13, 1881-1882; William Lyne Wilson, 1882-1883; Robert Carter Berkeley (Chairman of the faculty), 1883-1885; Eli Marsh Turner, 1885-July 21, 1893; Vice-president Powell Benton Reynolds (acting), July 24, 1893-1895; James L. Goodknight, 1895-August 6, 1897; (from August 6 to August 19, 1897, Vice-president Robert Allen Armstrong was nominally acting president); Jerome Hall Raymond, August 10, 1897-1901; Powell Benton Reynolds (acting), March 21, 1901-July 31, 1901; Daniel Boardman Purinton, August 1, 1901-July 31, 1911; Alexander R. Whitehill (acting), August 1, 1911-September 30, 1911; Thomas Edward Hodges, October, 1911-August 31, 1914; Frank Butler Trotter (acting), July 9, 1914-1916; 1916-1928; John Roscoe Turner, 1928-December 31, 1934; Robert Allen Armstrong (acting), January 1, 1935-September 30, 1935; Chauncey Samuel Boucher, October 1, 1935-August 31, 1938; Charles Elmer Lawall (acting), September 1, 1938-1939; 1939-August 31, 1945; Charles Thompson Neff, Jr., (acting), September 1, 1945-1946; Irvin Stewart, 1946-August 24, 1958; Clyde Lemuel Colson (acting), August 26, 1958-January 31, 1959; Elvis Jacob Stahr, Jr., February 1, 1959-January 25, 1961; Clyde Lemuel Colson (acting), January 26, 1961-December 31, 1961; Paul Ausborn Miller, January 1, 1962.

THE PHYSICAL PLANT

West Virginia University's Main Campus comprises 74.35 acres near the center of Morgantown. Its Evansdale campus, about one and one-half miles northwest of the Main Campus, consists of approximately 260 acres and was acquired in 1948. This campus is the site of the new buildings of the Colleges of Agriculture and Engineering, occupied in the Spring of 1961. In 1951, the Monongalia County Court deeded to the University approximately 85 acres of land adjoining 55 acres already owned by the University. This 140-acre tract, about one and one-half miles north of the Main Campus, is the site of the new University Medical Center. In 1960 the University acquired 58.05 additional acres in the area across a road from the Medical Center Mechanical Plant. This acreage is adjacent to 3 acres bequeathed to the University. The first building of the Center, the Mechanical Plant, was completed in 1954. The Basic Sciences Building was open for classes in September, 1957. Construction was completed on the University Hospital in December, 1959.

Much of the Main Campus is on high ground overlooking the Monongahela River and the surrounding countryside. The physical plant includes 49 state-owned buildings or structures on campus, five demonstration and experimental farms near Morgantown, four additional experimental farms and two Cooperative Extension centers located at suitable points throughout the State, a summer surveying camp for civil and mining engineering students, and a summer camp for forestry and biological science students. A new women's dormitory, Arnold Hall, was put into use in September, 1957, and an addition to Men's Hall, accommodating 250 students, was completed in September, 1959.

In the summer of 1961 completion of a large housing project provided 188 apartments for faculty, staff, and students at the Medical Center, as well as 276 dormitory spaces for women students and 86 apartments for faculty, staff, and students on the Main Campus.

LOCATION

The main campuses of the University are in Morgantown, Monongalia County, 80 miles southeast of Wheeling and 200 miles north of Charleston. The community is served by the Baltimore and Ohio Railroad (limousine service between Morgantown and Grafton), Lake Central Airlines, thirty truck systems and five bus lines, and W. Va. Routes 7, 73 and 92, and U. S. Routes 19 and 119. Morgantown is located on the Monongahela River, 72 miles south of Pittsburgh, Pa. Half of the population of the United States is within 500 miles of Morgantown.

ACCREDITATION

West Virginia University is a member of the North Central Association of Colleges and Secondary Schools. It is accredited by the North Central Association and various accrediting agencies.

ORGANIZATION

OPERATING FUNDS

Funds for operating the University's various divisions are derived from the following sources: (1) interest on the land-grand endowment of \$129,600; (2) annual appropriations by the Legislature; (3) Federal Morrill-Nelson and Bankhead-Jones funds; (4) student activities fees; (5) Hatch Act, Amended; (6) Agricultural Extension Consolidated; (7) tuition of high school students paid by Monongalia County Board of Education; (8) income derived from sale of farm and dairy products, as well as income from athletics, dormitories, dining halls, book store, student activities, hospital clinics, etc.; (9) grants by Federal agencies for special research and extension projects; (10) contributions by private benefactors for the support of scholarships, loan funds, and prizes, and (11) revenues from the State soft-drink tax dedicated to the establishment of a medical center for teaching and research in medicine, dentistry, nursing, and medical technology.

GOVERNMENT

Direction of educational, administrative, financial, and business affairs of the University is vested in the Board of Governors. The board is bipartisan and consists of nine members who are appointed by the Governor with staggered terms of service.

The University year is divided into two semesters of approximately eighteen weeks each and a Summer Session of two terms, one of six weeks and one of five weeks.

Acting in an advisory capacity to the President and assisting him in carrying out established University policies is a *Council of Administration*, composed of the President, the Vice-President, the Registrar, the Comptroller, and the deans of all colleges and schools, as well as other administrative officers who may be requested to take part in the deliberations of the Council.

The *University Senate*, a legislative body with jurisdiction over all academic matters that concern the entire University and all matters that concern more than one college or division, is composed of the President, the Vice-President, the Registrar, all professors, associate professors, and assistant professors in all colleges, schools, and divisions, and all chairmen of departments.

The *Graduate Faculty*, composed of all members who teach courses on the graduate level, sets the specific requirements and standards of quality for admission to candidacy for graduate degrees and for the awarding of graduate degrees.

The *Committee on Student Affairs* acts as an integral part of the whole organization of the University. Its program is bound up with that of the University as a whole and is designed to serve the larger academic and social objectives of modern education.

COLLEGES AND SCHOOLS

The components of the University, together with dates of establishment of the various colleges and schools, etc., follow:

Colleges: College of Arts and Sciences, 1895; College of Law, 1895; College of Engineering and Mechanic Arts, 1895 (changed to College of Engineering in 1960); College of Agriculture, 1895; College of Education, 1927; College of Pharmacy (changed to the School of Pharmacy in 1958), 1936; and the College of Commerce, 1952.

Schools: School of Music, 1897; the Summer Quarter, 1898-1900, Summer School, 1902-1931, and Summer Session, 1932; School of Medicine, 1912; School of Mines, 1926; Graduate School, 1930; School of Physical Education and Athletics, 1937, (changed to School of Physical and Health Education, Recreation and Safety, 1960); School of Journalism, 1939; School of Dentistry, 1953; School of Pharmacy (formerly the College of Pharmacy), 1958, and School of Nursing, 1960.

Divisions: Division of Military Science and Tactics, 1911; Division of Military and Air Science and Tactics, 1949; Division of Military Science and Tactics and Air Science, 1955; Division of Military Science and Air Science, 1960; Division of Home Economics, 1937; and the Division of Forestry, 1937.

Experiment Stations and Research Bureaus: Agricultural Experiment Station, 1888; Engineering Experiment Station, 1921; Government Research Bureau, 1931-1935; Bureau for Government Research, 1949; and the Bureau of Business Research, 1949.

Extension Service: Agricultural Extension (Cooperative Extension 1961), 1912; Mining and Industrial Extension, 1914; Education Extension, 1915; Liberal Arts Extension, 1916; University Extension, 1930; and the Institute of Industrial Relations, 1956.

The College of Agriculture, Forestry, and Home Economics; the College of Arts and Sciences, the College of Engineering; the School of Music, the School of Mines, the School of Nursing, and the School of Physical and Health Education, Recreation, and Safety are all degree-granting units admitting freshmen. The College of Education, the College of Commerce, the School of Dentistry, the School of Journalism, the School of Medicine, and the School of Pharmacy are professional colleges and schools requiring from two to three years of academic training as a foundation for professional work. All graduate instruction is administered by the Graduate School through the Graduate Faculty.

LIVING ACCOMMODATIONS

The University maintains five residence halls, two for men and three for women. For information as to accommodations and rates, address the Director of Residence Halls.

The Off-Campus Housing Adviser is an assistant to the Director of Student Affairs. His office is located at the University Housing Center, 719 College Avenue. This office will provide information regarding private housing in Morgantown and vicinity. All graduate women students and men students requiring living accommodations in private residences, apartments, or houses may write or call upon the Housing Adviser for assistance. Private housing off-campus is available at reasonable rates and is within easy walking distance of the campus. A few private residences are equipped to board students.

The University operates several hundred furnished and unfurnished apartments for students, faculty, and staff at reasonable rates. For information write to the Apartment Housing Office, 719 College Avenue.

HEALTH SERVICE

The University Health Service provides medical care to students of the University and supervises general campus health conditions. The staff includes four full-time and two part-time physicians, seven nurses, two laboratory technicians, and clerical personnel. The University Pharmacy, housed in the Health Center, is managed by the School of Pharmacy. The departments of Pathology and Microbiology cooperate in the laboratory examination of diagnostic materials.

The Health Service occupies the University Health Center, constructed in 1942. This three-story building is centrally located, fronting on College Avenue adjacent to Reynolds Hall. It is built of brick and concrete and is fireproof throughout. On the first floor are the treatment rooms, offices, and pharmacy. The second floor is occupied by laboratory and X-ray departments, and offices for physicians. The third floor contains a well-equipped infirmary.

The Health Service is in operation from 8:00 A.M. to 5:00 P.M. daily except Saturday and Sundays. Saturday hours are 8:00 A.M. to noon. Physicians are in attendance from 9:00 A.M. to 12:00 P.M. and 2:00 P.M. to 4:00 P.M. A nurse is present at all times in the Infirmary, and a University physician can always be reached by calling the Health Service, Extension U294 on the University exchange.

Each regularly enrolled University student pays a fee which provides for medical consultation and advice from University physicians. Moderate additional charges are made for room calls, X-rays, laboratory tests, minor operations, treatment of fractures, and drugs furnished by the Health Service or Pharmacy.

On his first enrollment in the University a student receives a complete physical examination which includes a blood test and urinalysis. The Health Service also gives special physical examinations to students in competitive athletics, to University food handlers, to employees of the Physical Plant Department, and to other groups as occasion may arise.

THE INFIRMARY

Students who need bed care for medical illness are hospitalized in the University Infirmary. The Infirmary is open only to full-time students. It is the policy of the Health Service to have all students requiring such care in the Infirmary. Students hospitalized in the Infirmary are under the care of Health Service physicians, although other qualified physicians may be seen in consultation when necessary. Patients will be admitted and discharged on the order of Health Service physicians.

Upon admission to the Infirmary the student receives two days of hospitalization without charge except for laboratory, X-ray, special medications, and private duty nurse fees. No additional charge is made for general nursing care, dressings, routine medications as commonly supplied by the Health Service, and food as ordered by the physician in charge. Laboratory examinations, X-rays, penicillin, and similar medication will be charged at the usual Health Service rate to students. Special nurses, when necessary, are at the expense of the student.

A student may not receive more than thirty days hospitalization for any one illness. Patients are to leave when discharged by the University physicians. When it becomes evident that a student's illness will be so prolonged as to prevent his completing work of the current semester, he may be discharged from the Infirmary when the attending physician or the Director of the Health Service considers that he may be moved without undue danger to his health. The services as indicated above are subject to the availability of space in the Infirmary. Twenty-two beds at present are ready for use.

STUDENT INSURANCE

A voluntary insurance plan is available to students to supplement the medical care offered by the Health Service. The plan provides for payment for hospitalization, surgeon, and consultant's fees, and other medical costs throughout the year, both in Morgantown and elsewhere. For cost of this insurance and details concerning coverage see the brochure available at the Health Service.

LIBRARY

The Library provides books and related materials for teaching, research, and cultural purposes. It maintains well-balanced collections in all subject fields included in the University curricula. Although primarily intended to supply the needs of the faculty and students of the University, the collections are available to any resident of West Virginia through the Library Extension Service Department. Facilities are available for the reproduction of material by microfilm and photostat.

The holdings of the University Libraries include 500,000 books and government documents, 33,500 maps, 8,100 reels of microfilm and over 50,000 technical reports. The bulk of this material is housed in the General Library. The other major collections are the Agriculture-Engineering Library (36,000 volumes), the Law Library (64,500 volumes), and the Medical Center Library (53,000 volumes). Some 4,000 periodicals are received currently. The Library is a depository for the United States Atomic Energy Commission.

The West Virginia Collection, located in the General Library, contains over three million manuscripts, papers, and records relating to the history and develop-

ment of the State. The Audio-Visual Department has some 1,800 educational films and 600 filmstrips, as well as 3,000 recordings.

During regular sessions, except on holidays and vacations, the Library is open from 7:55 A.M. to 10:00 P.M. Monday through Friday; from 7:55 A.M. to 5:00 P.M. on Saturdays; and from 2:00 P.M. to 10:00 P.M. on Sundays. During the Summer Session the weekday hours are from 7:55 A.M. to 9:00 P.M.; and only the Reserve Collection is available on Sundays from 2:00 P.M. to 5:00 P.M. During periods when the University is not in session, the hours are from 9:00 A.M. to 5:00 P.M. Monday through Friday; 9:00 A.M. to 12:00 noon Saturdays; closed all day Sundays and holidays (New Year's Day, Memorial Day, July 4, Thanksgiving Day, and Christmas Day). Changes in scheduled hours are posted in advance.

BOOK STORE

The University operates on each of its three campuses a complete book and stationery store where students may purchase at discounted prices the books, supplies and professional equipment needed in connection with their class work.

The Book Store on the Main Campus is located in the Book Store Building, with entrances from both Hunt Street and University Avenue. The Medical Center Branch Book Store is in the Basic Sciences Building, ground floor, across from the snack bar. The Evansdale Campus store is in the Engineering Sciences Building, ground floor, across from the student lounge.

The stores sell new and used textbooks and buy back from students their used textbooks. They stock books other than textbooks in all categories, art prints, general school supplies, office supply items, medical and engineering instruments and supplies, physical education uniforms for men and women, sporting goods, and University imprinted souvenir, gift and wearing apparel merchandise.

CULTURAL ACTIVITIES

The University, through the Committee on Convocations and Public Exercises, provides appropriate and desirable programs for students. The convocations form the basis of the cultural program, but there are others sponsored by various divisions of the University and community.

The University Cultural Series presents a special program of outstanding cultural events during each academic year and summer session, in the area of drama, music, and the dance.

Convocations consist of addresses by distinguished speakers, and musical and other entertainment features of special merit.

During the year students have an opportunity to attend their own legitimate theatre in which plays are presented by the Department of Speech. The University Radio Theatre also is an activity of the Department of Speech.

The University Symphony Orchestra concerts, individual recitals, and glee club concerts are sponsored by the School of Music.

KANAWHA VALLEY GRADUATE CENTER

The Kanawha Valley Graduate Center of Science and Engineering was established at Institute, W. Va., in 1958. The name was changed to the Kanawha Valley Graduate Center of West Virginia University in 1961. Courses of instruction leading to the master's degree in chemical engineering, chemistry, mechanical engineering, and business administration are available. Requirements for admission to graduate study in the Center and for completion of programs leading to the master's degree are the same as those in effect on the campus at Morgantown. For details of courses, schedules, tuition and fees, prospective students should write to The Director, Kanawha Valley Graduate Center of West Virginia University, Institute, W. Va.

FELLOWSHIPS AND ASSISTANTSHIPS

Stipends for most of the teaching assistantships listed below will be increased in 1963-64 if funds requested from the state legislature for this purpose are approved. Stipends in Arts and Sciences, Commerce, Journalism, Music, and Physical Education generally range from \$1,500 to \$2,000, depending on how advanced the appointee is as a graduate student.

Stipends are generally stated in terms of a 9 or 12 months appointment for half-time service, i.e., 20 hours service per week in the case of research assistantships and the teaching of two courses or the equivalent in laboratory assistance in the case of teaching assistantships. Departments may occasionally make appointments for less than half-time service with proportionately reduced compensation.

Assistants giving half-time service are generally advised to take no more than 12 credit hours in any semester. A few departments, as indicated below, stipulate a lower maximum credit load.

Applications should be made to the Dean of the College, or, in the case of Arts and Sciences, Engineering, and Medical Sciences, to the Chairman of the Department concerned on or before March 8, 1963.

AGRICULTURE

Agricultural Biochemistry—Research assistantships at \$2,200 for 12 months, half-time service, tuition exempt. Research assistantships at \$3,600 for 12 months, three-quarter-time service, maximum credit load 7 hours per semester, tuition exempt. Only candidates with M.S. degree or equivalent are eligible.

Agricultural Education—Teaching assistantships at \$2,200 for 12 months, half-time service, tuition exempt.

Agricultural Engineering—Teaching assistantships at \$2,200 for 12 months, half-time service, tuition exempt.

Agronomy and Genetics—Research assistantships at \$2,200 for 12 months, half-time service, tuition exempt. Teaching assistantship at \$2,200 for 12 months, half-time service, tuition exempt. Teaching assistantship at \$3,600 for 12 months, three-quarter-time service, maximum credit load 7 hours per semester, tuition exempt. Only candidates with M.S. degree or equivalent are eligible.

Animal and Veterinary Science—Research assistantship at \$3,600 for 12 months, three-quarter-time service, maximum credit load 7 hours per semester, tuition exempt. Only candidates with M.S. degree or equivalent are eligible. Teaching assistantships at \$2,200 for 12 months, half-time service, tuition exempt.

Dairy Science—Research assistantship at \$2,200 for 12 months, half-time service, tuition exempt. Teaching assistantship at \$2,200 for 12 months, half-time service, tuition exempt.

Home Economics—Teaching assistantships at \$2,200 for 12 months, half-time service, tuition exempt.

Horticulture—Research assistantships at \$2,200 for 12 months, half-time service, tuition exempt.

Plant Pathology, Agricultural Bacteriology, and Entomology—Research assistantships at \$2,200 for 12 months, half-time service, tuition exempt. Teaching assistantship at \$2,200 for 12 months, half-time service, tuition exempt.

Poultry Science—Research assistantships at \$2,200 for 12 months, half-time service, tuition exempt.

ARTS AND SCIENCES

Biology—Teaching assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

Chemistry—Teaching assistantships up to \$2,000 for 9 months, half-time service, tuition and chemistry fees exempt. Research fellowships and assistantships supported by contracts and grants from government, private, and industrial sources.

English—Teaching assistantships up to \$2,000 for 9 months, half-time service, tuition exempt.

Foreign Languages—French, German, Spanish—Teaching assistantships up to \$2,000 for 9 months, half-time service, tuition exempt.

Geology—United States Steel Foundation Fellowship at \$3,000 for 12 months, family allowance, tuition exempt. Teaching assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

History—Teaching assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

Mathematics—Teaching assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

Physics—Teaching assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

Political Science—Departmental assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

Psychology—Psychometric and laboratory assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt. Maximum credit load permitted in any one semester: 10 hours.

Sociology—Departmental assistantship up to \$2,000 for 9 months, half-time service, tuition exempt.

Speech—Teaching assistantships, up to \$2,000 half-time service, tuition exempt.

COMMERCE

Business Administration and Economics—Research assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

Industrial Relations—Research assistantships at \$1,200 for 9 months, half-time service, tuition exempt.

EDUCATION

Research and teaching assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

ENGINEERING

Teaching fellowships in aero-space, chemical, civil, electrical, industrial, mechanical engineering, and theoretical and applied mechanics, up to \$3,000 for 9 months, half-time service, tuition exempt.

ENGINEERING EXPERIMENT STATION

Research assistantships in aero-space, chemical, civil, electrical, industrial, mechanical, mining, nuclear, petroleum and geological engineering, and theoretical and applied mechanics, stipends \$125 to \$175 per month for 9 or 12 months, half-time service, tuition exempt.

JOURNALISM

Teaching assistantships up to \$2,000 for 9 months, half-time service, tuition exempt.

MEDICAL SCIENCE

Support from training, research and other grants in biochemistry, gross anatomy, microbiology, microanatomy, pharmacology, and physiology; stipends from \$1,800 to \$2,400 for 12 months.

MUSIC

Teaching assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

PHYSICAL AND HEALTH EDUCATION, RECREATION, AND SAFETY

Teaching and research assistantships, up to \$2,000 for 9 months, half-time service, tuition exempt.

NSF FELLOWSHIPS

National Science Foundation Cooperative Graduate Fellowship awards present the opportunity of financial support to graduate students in the fields of the mathe-

matical, physical, medical, biological, and engineering sciences, anthropology, economics, geography, the history and philosophy of science, psychology, sociology, and other science fields. The annual stipends are \$2,400. Applications are available at the Graduate School office and must be forwarded to the National Science Foundation by the University on November 1.

OAK RIDGE FELLOWSHIPS

The opportunity to participate in the Graduate Fellowship Program of the Oak Ridge Institute of Nuclear Studies is open to qualified graduate students in the fields of biology, chemistry, engineering, mathematics, physics, and other scientific fields. When certified by the University and after completion of his course work, the student has the opportunity to conduct research using the facilities of the Oak Ridge National Laboratory and other Oak Ridge facilities. The annual basic stipend is \$3,000, with dependency allowances. In some cases, graduate students may be offered the opportunity to acquire research experience through summer appointments at Oak Ridge National Laboratory prior to the time they are qualified to receive a fellowship.

THE SUMMER SESSION

The University holds a Summer Session of two terms of approximately five weeks each, commencing early in June and ending late in August. A limited number of graduate courses are offered in sequence so that the students may pursue a coherent program of work through a series of summer sessions. The summer schedules contemplate the needs of faculty members of public schools, normal schools, and colleges.

The requirements for admission and the credits allowed are subject to the same regulations as pertain to the regular academic year. Credit for work completed in summer sessions is equivalent in character to that of the regular year. Credit exclusively obtained in summer sessions may be applied in full to a Master's Degree and in part to the Degree of Doctor of Philosophy. Further details concerning the Summer Session may be obtained in the *Summer Session Announcements*.

ADMISSION TO THE GRADUATE SCHOOL

Applicants holding bachelor's degrees from West Virginia University or from other accredited institutions may be admitted to the Graduate School. The application for admission must be filed with the Registrar of the University, who will forward the application to the Dean of the Graduate School. The applicant must request the registrar of the college or school previously attended to send an official transcript directly to the Registrar of the University. The application and transcript should be received by the Registrar of the University at least one month in advance of registration days. Application forms may be obtained from the Registrar of the University.

Admission to the Graduate School does not constitute acceptance of the student by the major department of his choice. It merely grants the student permission to seek admission to the department. It is the responsibility of the student to make the contact at once to determine if he will be accepted by the department desired.

Undergraduate deficiencies, generally unsatisfactory background, or lack of adequate facilities in a given department may prevent acceptance by the department. In such instances, the student either must seek acceptance by another department or register as a "special" graduate student. A "special" graduate student is not a candidate for an advanced degree.

Eligible students who wish to further their education without reference to higher degrees may be admitted to the Graduate School and may elect courses for which they can satisfy the prerequisites.

The Dean of the Graduate School and the chairman of the department in which the student desires to do his major work will advise him concerning departmental prerequisites for admission, candidacy for an advanced degree, and major and minor advanced degree requirements.

FEES AND EXPENSES

All University fees are subject to change without notice.

All fees are due and payable at the Comptroller's desk in the Field House Annex (South) on the days of registration. Students must pay fees before registration is accepted and class tickets are released. Completion of arrangements for payment from University payroll checks, officially accepted scholarships, loan funds, grants or contracts shall be considered sufficient for acceptance of registration. Fees paid after regular registration must be paid at the Comptroller's office in the Administration Building. Any student failing to complete registration on regular registration days is subject to the late registration fee of \$10. Students registering pay the fees shown on page 25, plus special fees and deposits as required.

By order of the Board of Governors, no degree will be conferred upon any candidate prior to payment of all tuition, fees, and other indebtedness to any unit of the University.

SERVICE CHARGE ON RETURNED CHECKS

A service charge of 5 per cent of the amount of each check returned unpaid by the bank upon which it is drawn shall be collected unless the student can obtain an admission of error from the bank.

If the check returned by the bank was in payment of University and registration fees, the Comptroller's office shall declare the fees unpaid and registration cancelled if the check has not been redeemed within three days from date of written notice. In such a case the student may be reinstated upon redemption of the check, payment of the 5 per cent service charge, and payment of a late payment fee of \$10.

REMISSION OF FEES

Tuition and fees will be remitted to a student registered in the Graduate School or the College of Law who is employed by the University on a regular appointment, subject to the following:

(a) In no case will there be remission of fees payable to State special funds or those charged to special services (see "Special Fees") and flight fees.

(b) Except as provided in "c", a graduate teaching or graduate research assistant will receive remission of tuition and fees commensurate with the hours of service required by the terms of his appointment.

(c) A faculty member on full-time appointment at any recognized institution of higher learning located in West Virginia who is taking a course of graduate study at the University and holds an appointment as a graduate assistant under the terms of Order No. 3071 of the Board of Governors will receive full remission of tuition and fees.

(d) A regular appointment is effective at the beginning of a semester or a summer term. Exemption from tuition and fees must be claimed at the beginning of the registration period or, in the case of a substitute appointment, within ten days after the appointment has been made.

(e) A student who holds a regular University appointment and is eligible for remission of tuition and fees in the second semester of any regular academic year is also eligible for remission of tuition and fees in the summer session immediately following his term of appointment.

Students on regular University appointment who are registered in the Graduate School or the College of Law for twelve credit hours or more in any semester, or for five credit hours or more in any five-week summer term, and who qualify for remission of fees, are not subject to the fees payable to State special funds. They are not entitled to the services provided thereby without payment of the appropriate additional fees.

The wife (or husband) of any person employed by the West Virginia University Board of Governors for a faculty position with the rank of instructor or above, or

for a research position of equivalent rank, or as the administrative head of a University division, or as an assistant administrative head, shall be charged the same fees as resident students. The dependent children of the person so employed shall also be charged the same fees as resident students.

Effective from the date of employment, a full-time employee of West Virginia University shall be charged the same tuition and fees as resident students.

SPECIAL FEES

Late-registration fee (non-refundable) ¹	\$ 10.00
Graduation fee ²	10.00
Professional Engineering degree (including \$10 graduation fee)	25.00
Student's record fee ³	1.00
Certificate in Home Economics	2.00
Associate in Arts Degree	2.00
Special extra fee for flight training:	
A.E. 171	100.00
A.E. 172	100.00
A.E. 173	100.00
A.E. 175	100.00
A.E. 176	100.00
A.E. 177	100.00
Fee for change in registration (after 8th day)	1.00
Fee for examination for entrance credit, per unit	1.00
Fee for examination for advanced standing	3.00
Fee for General Educational Development tests (high-school level) ⁴	15.00
Certificate of Advanced Study in Education	2.00
Social Work certificate	2.00
Fee for reinstatement of students dropped from the rolls	3.00
Fee for examination of candidates for graduate degree ⁵	1.00
Diploma replacement fee	5.00
Physical Education Student Activity Fee	5.00
Student Identification Card Replacement Fee	1.00
Correspondence Course in Guided Reading (per course)	1.00
Driver Education Laboratory Fee	10.00
Labor Education Service (for informal activities)	2.00-10.00
Social Work Field Supervisory Fee (per year)	75.00

FEE FOR EXTENSION WORK

A fee of \$12 per semester hour is charged for each extension course.

FEES FOR UNDERGRADUATE AND GRADUATE MUSIC STUDENTS

I. Full-time students:

- A. Registered for Bachelors' or advanced degrees in Music or the Supervisory Training Program (in music):
 1. Resident students\$115.00 per semester
 2. Nonresident students\$280.00 per semester
- B. Registered in other colleges or schools, including the Graduate School, except as noted above in "A":
 1. Class courses in Music, the regular fee for the college or school in which registered with no additional fee.

¹This fee is not charged to students who complete registration during the regular registration days as set forth in the University Calendar. This fee became effective September 1, 1960.

²The graduation fee is payable by all students at the beginning of the semester or term in which they expect to receive their degrees.

³One transcript of a student's record is furnished by the Registrar without charge. This fee is charged for furnishing an additional transcript.

⁴If the applicant applies for admission to and registers in the University within twelve months of the date for his qualifying for the test, a ten dollar credit shall be established for him.

⁵For graduate students not otherwise enrolled at time of final examination.

2. Applied Music, the regular fee for the college or school in which registered plus Music fees as follows:
 - a. Band and orchestra instruments, voice, piano, organ⁶\$20.00
 - b. Applied Music Classes in band and orchestra instruments,
piano, voice\$ 5.00
 - c. Ensemble: Chamber Music, Accompanying\$ 5.00

II. Part-time students:

- A. Class courses in Music at the respective fee per credit hour (for resident students, \$8 per semester hour; for nonresident students, \$20 per semester hour).
- B. Applied Music along with at least one other class course, the fee for the Applied Music shall be the respective fee per credit hour plus music fees as follows:

LESSONS PER WEEK

	One	Two
1. Band and orchestra instruments, voice, piano, organ . . .	\$20	\$35
2. Applied Music Classes in band and orchestra instruments, piano, voice . . .	\$5.00 per semester	
3. Ensemble: Chamber Music, Accompanying . . .	\$5.00 per semester	

- C. Only courses in Applied Music, the fee shall be the respective fee per credit hour plus Music Fees as follows:

LESSONS PER WEEK

	One	Two
1. Band and orchestra instruments, voice, piano, organ . . .	\$27	\$39
2. Applied Music Classes in band and orchestra instruments, piano, voice . . .	\$5.00 per semester	
3. Ensemble: Chamber Music, Accompanying . . .	\$5.00 per semester	

Piano and Pipe-Organ Practice:

- (a) Piano for practice—one hour a day, \$6 per semester; two hours, \$10; three hours, \$14, four hours, \$18.
- (b) Pipe-organ practice—one hour a day, \$10 per semester.
- (c) Band and orchestra instruments—rental fee \$2.50 per semester.

SUMMER SESSION FEES⁷

	Resident	Nonresident
Tuition, per semester hour (Agriculture, Forestry, and Home Economics; Arts and Sciences; Commerce; Education; Engineering; Journalism; Mines, Music; Physical and Health Education, Recreation, and Safety)	*8.00 ⁷	*12.00 ⁷
Tuition per semester hour (Dental Hygiene, Law, Medical Technology, Nursing, Pharmacy)	*9.00	*14.00
Tuition, per semester hour (Dentistry and Medicine)	*12.00	*20.00
Health Service fee, per term	2.00	2.00
Mountainlair fee, per term	1.50	1.50
Cultural Program fee, per term	.75	.75
Student Union Building fee, per term	1.00	1.00

⁶Includes \$4.00 per semester hour Registration Fee imposed by law, effective June 1, 1959.

⁷Maximum, one lesson per week.

⁸The maximum tuition fee for West Virginia residents shall not exceed \$40.00 for the Summer Session. The total Registration Fee collected from any student during the Summer Session shall not exceed \$40.00.

SEMESTER FEES (See Page 25)

A part-time student (graduate or undergraduate) enrolled for courses in two or more colleges and schools shall pay fees at the rate per semester hour effective for the number of hours in each college and school.

If the student (graduate or undergraduate) is enrolled for 12 or more hours in courses offered by two or more colleges and schools, but less than 12 in any one, he shall be considered to be a full-time student and shall pay the fees for special services (Athletics, Health Service, Mountainlair, Cultural Program, and Student Union Building) in addition to the part-time rates per hour for courses in each college and school.

If the student (graduate or undergraduate) is enrolled for 12 or more hours in courses offered by colleges and schools in Group I, he shall pay the full-time rate effective for Group I. (Does not include Flight Training. Does not include Applied Music for students who are not candidates for degrees in Music.) This student shall pay the part-time rate for any courses in colleges and schools in Group II and Group III.

If the student (graduate or undergraduate) is enrolled for 12 or more hours in courses offered by colleges and schools in Group II, he shall pay the full-time rate effective for Group II and may elect courses in colleges and schools in Group I at no additional cost or may elect courses in colleges and schools in Group III at the part-time rate effective for Group III. (Does not include Applied Music or Flight Training.)

If the student (graduate or undergraduate) is enrolled for 12 or more hours in courses offered by colleges and schools in Group III, he shall pay the full-time rate effective for Group III and may elect courses in Group I or Group II at no additional cost. (Does not include Applied Music or Flight Training.)

DEPOSITS

The deposits required are: breakage deposit in chemistry, \$7 or \$12; breakage deposit for students enrolled in medical technology courses and in the School of Medicine, \$10; for students enrolled in other colleges and schools of the University electing courses in medical technology or medicine, \$5 for one laboratory course and \$10 for more than one course; air or military science deposit, \$20; breakage deposit in dentistry, \$10; nursing, \$12. Students enrolled in certain courses in Pharmacy, Medical Technology, Medicine, or Dentistry must pay a microscope rental fee of \$20.00 per semester.

⁸A full-time student is one who is registered for 12 or more semester hours of work each semester of the regular academic year, or 5 or more semester hours of work during the Summer Session. A full-time student during the regular academic year receives an Identification Card which entitles him to admission to all athletic events. A full-time student during the regular academic year or during the Summer Session is entitled to free medical consultation and advice from the University physician. A moderate charge is made for room calls, X-rays, special laboratory tests, drugs furnished by the University Pharmacy, minor operations, treatment of fractures and dislocations, and intravenous treatment.

⁹A part-time student is one who is registered for fewer than 12 semester hours per semester during the regular academic year, or for fewer than 5 semester hours during the Summer Session.

¹⁰No person shall be considered eligible to register in the University as a resident student who has not been domiciled in the State of West Virginia for at least twelve consecutive months next preceding college registration. No non-resident student may establish domicile in this State, entitling him to reduction or exemptions of tuition, merely by his attendance as a full-time student at any institution of learning in the State. A minor student whose parents acquire a West Virginia domicile after the student's original registration will be deemed to have the domicile of his parents and become entitled to pay resident fees. Moreover any student who has originally paid nonresident fees may become entitled to pay resident fees, if after an interim of nonattendance or otherwise he has established a valid legal domicile in this State at least twelve months prior to his registration in the University. In any event, the appointment of a guardian for a minor student temporarily resident in West Virginia, other than the designation of a natural guardian, shall not in and of itself operate to establish a West Virginia domicile for such student.

¹¹The minimum rate for non-credit courses is that charged for one semester hour of credit.

¹²Athletics Fee, Student Organizations Fee, Daily Athenaeum Fee, Health Service Fee, Mountainlair Fee, Cultural Program Fee, and Student Union Building Fee, all chargeable to Special Services, nonrefundable during this period.

SEMESTER FEES IN THE COLLEGES AND SCHOOLS (See footnotes 8, 9, 10, 11, and 12)

	Full Time		Part Time (Per Semester Hour)	
	Resident	Nonresident	Resident	Nonresident
GROUP I Agr., For., and Home Econ. Arts and Sciences Commerce Education Engineering Journalism Mines Music Physical and Health Education, Recreation, and Safety	\$65.00* plus Registration Fee of \$50.00, imposed by law, effective June 1, 1959.	\$230.00* plus Registration Fee of \$50.00, imposed by law, effective June 1, 1959.	\$4.00 plus \$4.00 per semester hour Registration Fee, imposed by law, effective June 1, 1959.	\$16.00 plus \$4.00 per semester hour Registration Fee, imposed by law, effective June 1, 1959.
GROUP II Dental Hygiene Law Medical Technology (Jr. and Sr. Years) Nursing Pharmacy	\$80.00* plus Registration Fee of \$50.00, imposed by law, effective June 1, 1959.	\$255.00* plus Registration Fee of \$50.00, imposed by law, effective June 1, 1959.	\$5.00 plus \$4.00 per semester hour Registration Fee, imposed by law, effective June 1, 1959.	\$17.00 plus \$4.00 per semester hour Registration Fee, imposed by law, effective June 1, 1959.
GROUP III Dentistry Medicine	\$142.00* plus Registration Fee of \$50.00, imposed by law, effective June 1, 1959.	\$360.00* plus Registration Fee of \$50.00, imposed by law, effective June 1, 1959.	\$8.00 plus \$4.00 per semester hour Registration Fee, imposed by law, effective June 1, 1959.	\$26.00 plus \$4.00 per semester hour Registration Fee, imposed by law, effective June 1, 1959.

*Includes Athletics \$8, Student Organizations \$1.25, Daily Athenaeum \$.75, Health Service Fee \$.6 (for dental hygiene, medical technology junior and senior years, dentistry and medicine—\$.9), Mountaintop Fee \$.4, Student Union Building Fee \$.3, and Cultural Program Fee \$.2.
Parkersburg Branch of West Virginia University: \$20 per semester hour.

REFUNDING OF FEES

A student who officially withdraws from the University may arrange for a refund of fees by submitting to the University Comptroller evidence of approval of the refund by the Registrar.

To withdraw officially a student must apply to the Registrar for permission. Semester fees will be returned in accordance with the following schedule:

First refund period ending on the second Saturday following the beginning of General Registration.	} 50% of Athletics Fee, Student Organizations Fee, Daily Athenaeum, Fee, Health Service Fee, Mountainlair Fee, Student Union Building Fee, and Cultural Program Fee, all chargeable to Special Services; and all other semester fees less \$2.50. (Under no circumstances is the amount retained less than \$2.50).
Second refund period ending on the fourth Saturday following the beginning of General Registration.	} 50% of Athletics Fee, Student Organizations Fee, Daily Athenaeum Fee, Health Service Fee, Mountainlair Fee, Student Union Building Fee, and Cultural Program Fee, all chargeable to Special Services; and 80% of all other semester fees.
Third refund period ending on the sixth Saturday following the beginning of General Registration.	} 60% of semester fees not chargeable to Special Services. ¹³
Last refund period ending on the eighth Saturday following the beginning of General Registration.	} 40% of semester fees not chargeable to Special Services. ¹³

The second Saturday following the beginning of general registration for a semester is the end of the first refund period. The second Saturday following the beginning of general registration for a summer term is the end of the refund period.

The University Board of Governors has ordered that students called to the armed services of the United States be granted full refund of refundable fees, but no credit, if the call comes before the end of the first three-fourths of the term, and that full credit by courses be granted to men called to the armed services of the United States if the call comes thereafter; provided, however, that credit as described above will be granted only in those courses in which the student is maintaining a passing mark at the time of his departure for military service. In the recording of final grades, for three-fourths of a term or more, both passing and failing grades are to be shown on the student's permanent record card.

¹³Athletics Fee, Health Service Fee, Mountainlair Fee, Cultural Program Fee, Student Organizations Fee, Daily Athenaeum Fee, and Student Union Building Fee, all chargeable to Special Services, non-refundable during this period.

Part II

ORGANIZATION AND REGULATIONS

By order of the Board of Governors of West Virginia University, a University Graduate School is established, whose roots are implanted in all University undergraduate work, irrespective of colleges, schools, or departments. The Graduate School is empowered: (1) to direct research and investigation with particular reference to problems of the State, and (2) to train and recommend to the Board of Governors candidates for the degrees listed below.

The Kanawha Valley Graduate Center of West Virginia University, located at Institute, was established in 1958. Courses leading to the master's degree in chemistry, chemical engineering, mechanical engineering, and business administration are available at the Center.

All regulations governing the Graduate School such as the determination of curricula, projects, majors, minors, standards, thesis requirements, and similar matters shall be formulated by the Executive Committee and the Dean of the Graduate School and presented to the Graduate Faculty for its consideration and action.

THE ADVISER

The adviser will arrange a specific course of study to be approved by the Dean and, in the case of candidates for advanced degrees, will preside at the candidate's qualifying and final examination.

THE FACULTY

The Graduate Faculty is composed of those faculty members who are actively assisting with any phase of the graduate program such as teaching graduate courses, directing graduate research, supervising thesis and problem work, advising graduate students and directing their graduate studies. Membership is by appointment by the Dean of the Graduate School following certification by the Executive Committee. The Deans of the various colleges and schools, the Vice President-Medical Center, the Provost of the University, and the President of the University are members ex officio.

GRADUATE DEGREES

Graduate degrees offered by the departments in the University which have been approved for graduate work are as follows:

- Master of Agriculture (M.Agr.)
- Master of Arts (A.M.)
- Master of Business Administration (M.B.A.)
- Master of Home Economics (M.H.E.)
- Master of Music (Mus.M.)
- Master of Science (M.S.)
- Master of Science in Engineering (M.S.E.)
- Master of Science in Forestry (M.S.F.)
- Master of Science in Aero-Space Engineering (M.S.A.E.)
- Master of Science in Agricultural Engineering (M.S.Agr.E.)
- Master of Science in Chemical Engineering (M.S.Ch.E.)
- Master of Science in Civil Engineering (M.S.C.E.)
- Master of Science in Electrical Engineering (M.S.E.E.)
- Master of Science in Industrial Engineering (M.S.I.E.)
- Master of Science in Mechanical Engineering (M.S.M.E.)
- Master of Science in Theoretical and Applied Mechanics (M.S.T.A.M.)
- Master of Science in Engineering of Mines (M.S.E.M.)

Master of Science in Nuclear Engineering (M.S.N.E.)
Master of Science in Home Economics (M.S.H.E.)
Master of Science in Home Economics Education (M.S.H.E.Ed.)
Master of Science in Journalism (M.S.J.)
Master of Social Work (M.S.W.)
Doctor of Philosophy (Ph.D.)
Doctor of Education (Ed.D.)

GRADUATE CERTIFICATES

Graduate Certificates offered by certain departments or divisions of the University are:

Certificate of Advanced Study in Education

PROFESSIONAL DEGREES

The following professional degrees are conferred upon graduates of the College of Engineering and the School of Mines of West Virginia University on the basis of practical experience and study in absentia, the presentation of a thesis, and an oral final examination:

Aero-Space Engineer (A.E.)
Chemical Engineer (Ch.E.)
Civil Engineer (C.E.)

Electrical Engineer (E.E.)
Mechanical Engineer (M.E.)
Engineer of Mines (E.M.)

REQUIREMENTS FOR THE GRADUATE DEGREE

GENERAL REGULATIONS

1. CANDIDACY

Admission to candidacy for any graduate degree is conditioned upon the fulfillment of the requirements for admission to the Graduate School, and also the particular requirements of undergraduate and graduate preparation for the field of study in which the student wishes to specialize. Unconditional admission to candidacy for an advanced degree involves a suitable period of graduate work in residence in which the student demonstrates his ability to do work of graduate caliber. Detailed information concerning candidacy for the Master's Degree and the Doctor's Degree may be found on the pages immediately following.

2. REQUIREMENT TO TAKE GRADUATE RECORD EXAMINATION

Students admitted to the Graduate School to begin a course of study for a degree or for teacher certification after September 1, 1962 will be required to submit scores in the general aptitude test of the Graduate Record Examination. The student's scores in the aptitude test will not affect his admission to or standing in the Graduate School. However, an individual department offering graduate work may consider both aptitude scores and the score in the appropriate advanced test of the Graduate Record Examination in deciding whether to admit a graduate student as a candidate for a degree in the department.

Students should arrange to take the general aptitude test and, if required by the major department, the appropriate advanced test of the Graduate Record Examination prior to their first registration at the University and should request the Educational Testing Service to forward their scores to the Dean of the Graduate School. Students who are unable to do this will be admitted to the Graduate School provisionally and will be required to take the Graduate Record Examination on the first date that it is offered on the West Virginia University campus, or elsewhere, after their admission, unless an extension of time is allowed by the graduate dean.

Information as to dates when the graduate Record Examination will be offered on the West Virginia University campus can be obtained from the Graduate Office. The fee for the aptitude examination is \$7.00; for an advanced test \$8.00; for both examinations \$12.00.

Those planning to take the examination must apply to the Educational Testing Service, Princeton, New Jersey, at least fifteen days prior to the date of the examination.

3. SCHOLARSHIP

No credits are acceptable toward an advanced degree which are reported with a grade lower than "C."

Reasonable standards of oral and written English must be maintained.

4. CURRICULUM

Credit toward a graduate degree may be obtained only for courses listed in these *Announcements* and numbered 200-399.

No more than 15 hours of graduate courses in any one semester nor more than 6 hours of graduate courses in any one term of the Summer Session may be carried by a student. Any exception to this rule must be approved in advance by the Dean of the Graduate School.

5. RESIDENCE AND EXTENSION

Residence credit for special field assignments and for work taken off the University campus shall be allowed only with prior approval of the Dean.

No more than 15 hours of extension work may be counted by any one student toward the Master's Degree.

For majors in Education no more than 15 hours by extension may be counted toward the Master's Degree and of these 15 no more than 8 hours may be obtained before the student completes at least 6 hours in residence on campus.

Full-time in-service teachers may obtain no more than 9 semester hours of credit toward the Master's Degree in any one academic year.

The maximum credit that students pursuing graduate work by extension may receive in any one field shall be 8 semester hours.

No more than 6 hours of graduate credit obtained in other approved institutions may be considered in meeting the requirements for the Master's Degree at West Virginia University.¹ Approval in writing must be secured in advance to elect graduate courses offered elsewhere. Credit will not be established here until the student has successfully completed at least 12 semester hours of graduate work at West Virginia University. Graduate credits so accepted toward the Master's Degree must meet the usual departmental requirements for a continuous and unified program of graduate study and will reduce correspondingly the number of hours of graduate work by extension offered in West Virginia University extension centers that may be offered in meeting the requirements for the Master's Degree.

No credits earned by extension prior to the admission of the student to graduate work and acceptance for graduate study may be counted toward meeting the requirements for the Master's Degree. However, seniors in the colleges of West Virginia University and in colleges where West Virginia University offers graduate courses by extension who are within 10 semester hours of graduation may, with the approval of the Dean of the Graduate School, enroll for graduate courses for which they may receive graduate credit after obtaining their bachelor's degrees. Such graduate courses must not have been offered for undergraduate credit, and in every case permission must have been requested before or at the time of enrolling for the course or courses. Normally, the maximum amount of credit available to a senior by petition in this manner before he completes all requirements for the baccalaureate degree and gains admission to the Graduate School will be 15 semester hours.

Each graduate student in residence, whether taking course work or engaged in conducting research or in writing a thesis or report, must register at the beginning of each semester or term during which graduate work is being done. He must be registered during the session in which he is to appear for final examination. Under exceptional conditions and with the prior approval of the Dean a graduate student may be permitted to meet a portion of the requirements for the degree in absentia, provided the customary residence and other requirements are met.

6. LIMITATION OF CREDIT LOADS FOR EMPLOYED GRADUATE STUDENTS

Graduate students will be required by their advisers to limit their credit loads in proportion to the outside service rendered and the time available for graduate study. In general, persons in full-time service to the University, or other employer, will be advised to enroll for no more than 6 hours of work in any regular semester or 3 hours in any 5-week summer term. Maximum credit loads for students who are employed are:

BASIS OF EMPLOYMENT	MAXIMUM CREDIT LOAD Per	
	Per Semester	Summer Term of Five or Six Weeks
Full-time employees	6	3
Three-fourths-time employees	9	3
Half-time employees	12	4
One-fourth-time employees	15	5

Part-time students employed on a basis other than those listed will be advised to take credit loads in relative amounts.

7. THESES AND PROBLEM REPORTS

All theses and problem reports shall be presented in the form prescribed at least one month previous to the Commencement Day on which the degree is expected. If the thesis or problem report is accepted, typewritten and bound copies shall be submitted to the Office of the Graduate School at least one week before the degree is to be conferred; a minimum of five copies of the master's thesis and doctor's dissertation, or four copies of the problem report, is required.

8. FINAL EXAMINATIONS

The candidate shall not be eligible for the final examination until his thesis or problem report has been approved by the examining committee. Following approval of the candidate's thesis or problem report and satisfactory completion of the courses in residence and satisfaction of other graduate requirements, he shall be given a final examination by his advisory committee. Examining committees for theses and for final examinations for advanced degrees shall contain no fewer than three members for candidates for the Master's degree, and no fewer than five members for candidates for the Doctor's degree. In order to have his thesis accepted or to be considered as having satisfactorily passed his examination, the candidate shall have no more than one unfavorable vote in each case.

9. REQUEST FOR DEGREE

At the time of registration for the semester or session in which the candidate expects to receive a graduate degree, he shall submit a formal request to the Dean of the Graduate School for the conferring of such degree. The candidate must have completed all requirements for the degree which he wishes to receive, at least one week before Commencement Day.

10. COMMENCEMENT ATTENDANCE

Candidates for degrees to be conferred at the close of the second semester are expected to be present in person to receive their degrees.

¹This regulation applies to all master's degrees based upon a total credit requirement of 30 to 46 semester hours. The degree of Master of Social Work is based upon a total credit requirement of 54 to 60 semester hours, 24 to 30 of which may be transferred under suitable conditions, but the last 30 of which must be earned and completed in West Virginia University.

THE DEGREES OF MASTER OF ARTS AND MASTER OF SCIENCE†

REQUIREMENTS FOR CANDIDACY

Satisfactory fulfillment of General Regulation No. 1 for graduate degrees will admit an applicant to candidacy.

REQUIREMENTS FOR COMPLETION

The completion within a period of seven years² immediately preceding the conferring of the degree, except with the permission of the Dean, of no less than 30 credit hours of graduate work approved by the adviser.

Residence: A minimum of two semesters is required, or one semester and three summer terms, or five summer terms of residence in full-time graduate study at West Virginia University. For students offering 15 credit hours in extension, a minimum period of residence at West Virginia University of one semester or three summer terms shall be required for the Master's Degree.

Program: In general, when a thesis is offered, the program will consist of 24 hours or more of suitable course work and 1 to 6 hours of thesis or research.

Thesis or Problem Report: A thesis or problem report granting no more than 6 hours of credit may be required by the faculty of the college, school, or department in which the candidate's major interest lies.

Final Examination: An examination, oral or written or both, at the option of the candidate's examining committee, shall be required, covering the candidate's thesis or problem report, studies in his major and minor fields, and his ability to apply facts and principles.

Special Requirements: The candidate must meet the special requirements of the department in which he pursues his major study.

THE DEGREES OF MASTER OF AGRICULTURE AND MASTER OF HOME ECONOMICS

Requirements: The requirements for and regulations governing the granting of these two degrees are the same as those for the degree of Master of Science with the following exceptions:

1. Candidates for the degree of Master of Agriculture and Master of Home Economics shall have previously completed the requirements for the degree of Bachelor of Science in Agriculture or Bachelor of Science in Home Economics, or their equivalents.

2. A research thesis shall not be required, but a problem report on some phase of agriculture or home economics shall be required. Not more than 3 semester hours of credit may be allowed for the problem report, which must be approved by the student's committee. The report must be submitted in the form prescribed by the regulations of the Graduate School.

3. The program of work shall be such that the emphasis will be on breadth of knowledge in the field of agriculture or home economics, as the case may be, rather than upon study in one narrow field of science. To insure such breadth of training, the student must take work in at least five subject-matter fields. Not more than 10 credits will be accepted in any one field and not more than 10 credits from other colleges in the University will be accepted.

4. Special regulations may be made by the subject matter division concerned, and approved by the Dean of the Graduate School.

†Major and minor work toward the master's degree is offered by most of the departments and divisions of the University. Offerings of these divisions and departments are given in Part IV.

²This ruling was discontinued temporarily during the war period. It was reinstated, effective June 1, 1948, as follows:

Beginning with the first summer term of 1948, the seven-year rule will again be put into effect with the provision that, in the cases of students who have already started their graduate programs, the adviser and the Dean of the Graduate School will determine whether work taken before the seven-year period shall be accepted for credit. If the adviser and the Dean cannot agree, the case shall be brought before the Executive Committee for review. In the event that a graduate student began work during the war period, an extension up to a maximum of five years may be granted.

THE DEGREE OF MASTER OF SOCIAL WORK REQUIREMENTS

The degree of Master of Social Work is conferred by the University upon those students satisfactorily completing the requirements as established by the Graduate School. These requirements are:

1. Broad pre-professional training including not fewer than 24 hours of undergraduate work in the social sciences.
2. Completion of graduate courses approved by the Department of Social Work totaling not fewer than 54 semester hours, of which the last 30 hours shall have been completed in West Virginia University.
3. Completion of 20 semester hours of supervised field work under faculty direction.
4. Completion of a problem report.
5. Demonstration of competency in the theory and practice of social work to the satisfaction of the faculty of the Department. This will include passing with a satisfactory grade a comprehensive final examination, which may be oral or written, or both, at the discretion of the Department. The degree will not be awarded solely for credits earned.

For most students the requirements for the degree of Master of Social Work can be met in two full years of study.

INTERDEPARTMENTAL PROGRAMS

Industrial Relations. Degree: Master of Science. (See page 166).

Rehabilitation Counseling. Degree: Master of Science. (See page 189).

THE CERTIFICATE OF ADVANCED STUDY IN EDUCATION

REQUIREMENTS

This is a distinct and terminal program including one full year of graduate study beyond the Master's Degree. The program is open to school administrators, supervisors, counselors, and teachers who furnish evidence of significant and appropriate teaching experience or closely allied educational work. The requirements for the certificate are: completion of 30 approved semester hours in residence earned after the conferring of the Master's Degree, including 6 to 12 semester hours of research. Persons expressing a desire to pursue the program leading to the certificate must satisfy a College of Education faculty committee on prerequisites.

THE DEGREE OF DOCTOR OF PHILOSOPHY

REQUIREMENTS FOR CANDIDACY

Admission to the Graduate School and enrollment in graduate courses does not of itself imply acceptance of the applicant for a Doctor's Degree. After a period of residence the applicant will be admitted to a comprehensive preliminary or qualifying examination (either oral, or written, or both) in which he must demonstrate: (a) a grasp of the important phases and problems of the field of study in which he proposes to major and an application of their relation to other fields of human knowledge and accomplishments; (b) the ability to employ rationally the instruments of research that have been developed in his major field; and (c) the ability to read French and German in a satisfactory manner.³

³In determining the candidate's proficiency in the two requisite foreign languages the major department must choose one of the following procedures:

- (1) The examination may be conducted by the appropriate language department, or
- (2) The examination may be conducted by a committee of three members—one member from the candidate's major field, one member from a related subject matter field, and one member from the appropriate language department.

With the approval of the Dean of the Graduate School, one other language may be substituted for French or German.

When an applicant has successfully passed his qualifying examination he will be formally promoted to candidacy for the Doctor's Degree. Admission to candidacy must precede the final examination for the Doctor's Degree by at least one academic year. Graduate courses pursued in fulfillment of the requirements for the Master's Degree, if of suitable character and quality, may be credited toward the doctorate.

REQUIREMENTS FOR COMPLETION

(a) *Curriculum*: The Degree of Doctor of Philosophy is not awarded for the mere accumulation of course credits nor for the completion of a definite residence requirement. The exact amount and nature of course work to be undertaken by a candidate will be determined in light of his previous preparation and the demands of his chosen field of application. The aggregate of correlated courses of graduate instruction should, however, be no less than 60 semester hours, exclusive of research or thesis, except research or thesis credits earned for the Master's Degree. These credits shall be ordered and distributed so as to promote broad and systematic knowledge and the ability to carry on independent research.

(b) *Residence*: In general, the requirements for the degree of Doctor of Philosophy contemplate at least three years of full-time graduate work beyond the Bachelor's Degree. A minimum of two semesters of residence in full-time graduate study, or its equivalent, at West Virginia University is required.

(c) *Thesis*: The candidate must submit a thesis pursued under the direction of the faculty of this University on some problem in the field of his major interest. The thesis must present the results of the candidate's individual investigation and must embody a definite contribution to knowledge.

(d) *Special Requirements*: The candidate must satisfy such special requirements, subject to approval of the Dean of the Graduate School, as may be required by the faculty of the college, school, or department in which his major lies. All required examinations in modern languages shall be taken not later than one academic year before the final examination for the degree.

(e) *Final Examination*: If the candidate's thesis is approved and he has fulfilled all other requirements stated above, he will be admitted to final oral examination on his thesis before his examining committee. At the option of this committee, a comprehensive written examination also may be required.

NOTE: Departments offering the Degree of Doctor of Philosophy are: Agricultural Biochemistry and Nutrition, Agronomy and Genetics, Biology, Chemical Engineering, Chemistry, Geology, History, Philosophy and Psychology, Physics, Plant Pathology, Bacteriology, and Entomology, Political Science, Medical Biochemistry, Microbiology, Pharmacology, Physiology, Gross and Neurological Anatomy, the School of Music, and the College of Engineering.

THE DEGREE OF DOCTOR OF EDUCATION

This is a professional degree open to school leaders, administrators, teachers, and counselors who furnish evidence of significant and appropriate teaching experience. Persons expressing a desire to pursue the program leading to this degree must satisfy a College of Education faculty Committee on Prerequisites. (See page 127).

Part III

THE GRADUATE FACULTY

Ex officio members: The President of the University, the Vice President—Medical Center, the Provost, and Deans of the various colleges and schools.

COLLEGE OF AGRICULTURE, FORESTRY, AND HOME ECONOMICS

AGRICULTURAL BIOCHEMISTRY AND NUTRITION

WAYNE WESLEY LUCHSINGER, PH.D., *Associate Professor of Agricultural Biochemistry and Nutrition* (1960).

GEORGE AIKEN McLAREN, PH.D., *Professor of Agricultural Biochemistry and Nutrition* (1959), 1955.

ROBERT LESLIE REID, PH.D., *Assistant Professor of Agricultural Biochemistry and Nutrition* (1960), 1957.

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

WALTER WARDLAW ARMENTROUT, PH.D., *Professor of Agricultural Economics* (1939), 1924.

ALFRED LOWELL BARR, PH.D., *Associate Professor of Agricultural Economics* (1961).

JAMES HARRIS CLARKE, M.S., *Professor of Agricultural Economics* (1960), 1939.

HOMER CLARK EVANS, PH.D., *Chairman and Professor of Agricultural Economics* (1959), 1949.

LEONARD MARION SIZER, PH.D., *Associate Professor of Rural Sociology* (1959), 1955.

GEORGE E. TOBEN, M.S., *Professor of Agricultural Economics* (1960), 1946.

AGRICULTURAL EDUCATION

RUSSELL CLARKE BUTLER, PH.D., *Chairman and Professor of Agricultural Education* (1956), 1944.

JOHN JACKSON HARVEY, PH.D., *Associate Professor of Agricultural Education for Co-operative Extension Education Teaching* (1961), 1953.

WARREN GEORGE KELLY, M.S., *Assistant Professor of Agricultural Education* (1957).

OLIVER CLAUDE MCGHEE, M.S., *Assistant Professor of Agricultural Education* (1961).

AGRONOMY AND GENETICS

NEWTON MOORE BAUGHMAN, PH.D., *Professor of Agronomy* (1957), 1949.

EVERETT MILTON JENCKS, PH.D., *Assistant Professor of Agronomy* (1957).

MELVIN WALTER JOHNSON, JR., PH.D., *Associate Professor of Agronomy* (1960), 1956.

GERALD ALVIN JUNG, PH.D., *Associate Professor of Agronomy* (1962), 1958.

GEORGE GORDON POHLMAN, PH.D., *Chairman and Professor of Agronomy* (1938), 1930.

IGOR VLADIMIR SARKISSIAN, PH.D., *Associate Professor of Agronomy* (1962).

VALENTIN ULRICH, PH.D., *Associate Professor of Genetics* (1962), 1957.

WILLEM ADOLPH VAN ECK, PH.D., *Assistant Professor of Agronomy* (1957).

COLLINS VEATCH, PH.D., *Professor of Agronomy* (1959), 1945.

ANIMAL AND VETERINARY SCIENCE

GERALD CLIFTON ANDERSON, PH.D., *Professor of Animal Science* (1955), 1950.

LESLIE DOZSA, D.V.M., *Associate Professor of Veterinary Science* (1961), 1957.

DONALD JAMES HORVATH, PH.D., *Associate Professor of Animal Science* (1960), 1957.

HAROLD EDWARD KIDDER, PH.D., *Professor of Animal Science* (1960), 1957.

JAMES LEONARD McBEE, PH.D., *Assistant Professor of Animal Science* (1959).
 RALPH GERALD MITCHELL, PH.D., *Associate Professor of Dairy Science* (1960), 1957.
 NORMAN OLAF OLSON, D.V.M., *Professor of Veterinary Science* (1948).
 ROBERT LESLIE REID, PH.D., *Assistant Professor of Agricultural Biochemistry and Nutrition* (1960), 1957.
 JAMES ALEXANDER WELCH, PH.D., *Acting Chairman and Professor of Animal Science* (1962), 1952.

DAIRY SCIENCE

RICHARD ATKINS ACKERMAN, M.S., *Assistant Professor of Dairy Science* (1946), 1928.
 RALPH GERALD MITCHELL, PH.D., *Associate Professor of Dairy Science* (1960), 1957.
 ALLEN HUFF RAKES, PH.D., *Assistant Professor of Dairy Science* (1960).
 ROBERT HAMILTON THOMAS, PH.D., *Associate Professor of Dairy Science* (1958).
 SAMUEL JOSEPHUS WEESE, M.A., *Associate Professor of Dairy Science* (1951), 1945.

FORESTRY

MAURICE GRAHAM BROOKS, M.S., *Professor of Wildlife Management* (1947), 1938.
 JAMES HAROLD BROWN, M.F., *Assistant Professor of Silviculture* (1961), 1957.
 KENNETH LLEWELLYN CARVELL, D.FOR., *Associate Professor of Silviculture* (1956), 1953.
 ALLEN WRIGHT GOODSPEED, M.F., *Professor of Forest Management* (1949).
 W. CLEMENT PERCIVAL, PH.D., *Director and Professor of Forestry* (1939), 1934.
 ROBERT LEO SMITH, PH.D., *Assistant Professor of Wildlife Management* (1958).
 EARL HAVEN TRYON, PH.D., *Professor of Silviculture* (1952), 1945.

HOME ECONOMICS

SARA ANN BROWN, PH.D., *Professor of Home Economics and Education* (1955), 1946.
 BABETTE GRAF, M.S., *Assistant Professor of Nutrition* (1961).
 MARY ROSE JONES, M.S., *Associate Professor of Home Economics* (1959), 1941.
 RUTH DOUGLAS NOER, M.S., *Professor of Home Economics* (1938), 1925.
 FRANCENA L. NOLAN, PH.D., *Director and Professor of Home Economics* (1961).
 CARL B. TAYLOR, M.A., *Assistant Professor of Family Life* (1961).
 ELISABETH STELLE YEARICK, PH.D., *Associate Professor of Nutrition* (1960).

HORTICULTURE

WILLIAM HENRY CHILDS, PH.D., *Professor of Horticulture* (1953), 1931.
 WILLIAM ROBERT FORTNEY, PH.D., *Associate Professor of Horticulture* (1960), 1956.
 RAY STANLEY MARSH, A.M., *Professor of Horticulture* (1936).
 OLIVER MEADER NEAL, JR., PH.D., *Associate Professor of Horticulture* (1959), 1942.
 OSCAR EDMUND SCHUBERT, PH.D., *Professor of Horticulture* (1961), 1949.
 EION GEORGE SCOTT, PH.D., *Chairman and Professor of Horticulture* (1962).
 GLENN EDWARD STEYERS, M.S., *Associate Professor of Horticulture* (1960).
 KYLE CHESTER WESTOVER, PH.D., *Professor of Horticulture* (1945), 1921.

PLANT PATHOLOGY, BACTERIOLOGY, AND ENTOMOLOGY

ROBERT EVAN ADAMS, PH.D., *Associate Professor of Plant Pathology* (1960), 1953.
 HORACE LESLIE BARNETT, PH.D., *Chairman of Plant Pathology, Bacteriology and Entomology and Professor of Mycology* (1960), 1945.
 CARL KESTER DORSEY, PH.D., *Professor of Entomology* (1951).
 EDWARD SUMNER ELLIOTT, PH.D., *Associate Professor of Plant Pathology* (1961), 1953.
 MANNON ELIHU CALLEGLEY, JR., PH.D., *Professor of Plant Pathology* (1960), 1949.
 JULIAN GILBERT LEACH, PH.D., *Professor of Plant Pathology* (1938).
 VIRGIL GREENE LILLY, PH.D., *Professor of Physiology* (1949), 1927.
 RODNEY PHILIP TRUE, PH.D., *Professor of Plant Pathology* (1955), 1949.
 HAROLD ALBERT WILSON, PH.D., *Professor of Agricultural Bacteriology* (1957), 1947.

POULTRY SCIENCE

HAROLD MARTENEY HYRE, M.S., *Associate Professor of Poultry Science* (1944), 1931.
HOMER PATRICK, Ph.D., *Chairman and Professor of Poultry Science* (1957).

STATISTICS

ROBERT STANDISH DUNBAR, JR., Ph.D., *Professor of Statistics and Statistician* (1960), 1952.

COLLEGE OF ARTS AND SCIENCES

ART

JOHN DONALD CLARKSON, M.A., *Chairman and Professor of Art* (1961), 1948.
BARBARA ADELINE DRAINER, M.A., *Assistant Professor of Art* (1957), 1952.
BEN FRANK FREEDMAN, M.A., *Assistant Professor of Art* (1962).
JOE FRANCIS MOSS, M.A., *Instructor in Art* (1960).
CHARLES EDWIN PATTON, A.M., *Professor of Art* (1951), 1939.

BIOLOGY

CHARLES HENRY BAER, Ph.D., *Assistant Professor of Biology* (1961), 1948.
HERALD DURWARD BENNETT, Ph.D., *Professor of Botany* (1961), 1948.
ARNOLD BENSON, M.A., *Instructor in Biology* (1959).
ROBERT LEE BIRCH, M.S., *Instructor in Zoology* (1948).
ROY BURDETTE CLARKSON, Ph.D., *Assistant Professor of Biology* (1960), 1956.
JESSE FRANKLIN CLOVIS, Ph.D., *Associate Professor of Biology* (1962), 1957.
MULLEN OGLE COOVER, M.S., *Instructor in Biology* (1961), 1960.
EARL LEMLEY CORE, Ph.D., *Chairman of Biology and Professor of Botany* (1942), 1928.
LLOYD RAYMOND GRIBBLE, Ph.D., *Professor of Zoology* (1947), 1929.
ETHEL CHARLOTTE MONTIEGEL, M.S., *Instructor in Zoology* (1956).
CHARLES NORMAN, Ph.D., *Professor (part-time) of Biology* (1961), 1953.
LELAND HART TAYLOR, Sc.D., *Professor of Zoology* (1939), 1922.
ROBERT JOHN TOLBERT, Ph.D., *Associate Professor of Biology* (1962), 1959.
LEAH ANN WILLIAMS, M.S., *Instructor in Biology* (1959).

CHEMISTRY

ARMAND RENE COLLETT, Ph.D., *Professor of Chemistry* (1939), 1924.
JOHN ARTHUR GIBSON, JR., Ph.D., *Professor of Chemistry* (1952), 1926.
JACK DANIEL GRAYBEAL, Ph.D., *Associate Professor of Chemistry* (1962), 1957.
GEORGE ARTHUR HALL, JR., Ph.D., *Associate Professor of Chemistry* (1956), 1950.
JAMES LESTER HALL, Ph.D., *Chairman and Professor of Chemistry* (1962), 1946.
JAMES BLAKE HICKMAN, Ph.D., *Professor of Chemistry* (1962), 1946.
GEORGE LOUIS HUMPHREY, Ph.D., *Associate Professor of Chemistry* (1957), 1952.
CHARLES LESTER LAZZELL, Ph.D., *Professor of Chemistry* (1946), 1922.
DENNIS WILLIAM HERBERT MACDOWELL, Ph.D., *Assistant Professor of Chemistry* (1959).
CHESTER WILLIAM MUTH, Ph.D., *Associate Professor of Chemistry* (1956), 1949.
ARMINE DEANE PAUL, Ph.D., *Associate Professor of Chemistry* (1961), 1955.
PETER POPOVICH, Ph.D., *Associate Professor of Chemistry* (1960), 1946.
DALE LEROY WILHELM, Ph.D., *Associate Professor of Chemistry* (1959), 1954.
ANTHONY WINSTON, Ph.D., *Assistant Professor of Chemistry* (1959).

ENGLISH

CARTER RICHARD BISHOP, Ph.D., *Professor of English* (1952), 1929.
JAMES PAUL BRAWNER, Ph.D., *Chairman and Professor of English* (1952), 1935.
STEPHEN FULLER CROCKER, M.A., *Professor of English* (1946), 1931.
JOHN WILLIAM DRAFER, Ph.D., *Professor of English* (1929).

RUEL ELTON FOSTER, Ph.D., *Professor of English* (1957), 1941.
 PATRICK WARD GAINER, Ph.D., *Professor of English* (1957), 1946.
 JOHN LEWIS HICKS, JR., M.A., *Assistant Professor of English* (1960), 1949.
 JOHN HUBERT JOHNSTON, Ph.D., *Assistant Professor of English* (1960), 1954.
 MARY NADINE PAGE, M.A., *Assistant Professor of English* (1946), 1925.
 HELEN PURINTON PETTIGREW, Ph.D., *Associate Professor of English* (1955), 1921.
 GORDON MARSHALL PITTS, Ph.D., *Assistant Professor of English* (1960).
 JOHN F. STASNY, M.A., *Instructor in English* (1955).

FOREIGN LANGUAGES

Executive Committee: Professors HERRERA, MANNING, STILWELL, *Chairman*.
 WILLIAM FRANKLIN BOGCESS, Ph.D., *Assistant Professor of Classics* (1962).
 EMILE GEORGE FRERE, Ph.D., *Associate Professor of Romance Languages* (1947).
 FRANCISCO HERRERA, M.A., *Associate Professor of Romance Languages* (1946).
 VICTOR JACOB LEMKE, Ph.D., *Professor of German* (1939).
 ARTHUR COOK MCBRIDE, DOCTEUR DE L'UNIVERSITE BORDEAUX, *Professor of Romance Languages* (1926).
 WARREN FRANCIS MANNING, Ph.D., *Professor of Romance Languages* (1928).
 ARMAND EDWARDS SINGER, Ph.D., *Professor of Romance Languages* (1940).
 ROBERT STILWELL, Ph.D., *Professor of German* (1947).
 REBECCA ESTRA WADE, M.A., *Assistant Professor of Romance Languages* (1945).

GEOLOGY AND GEOGRAPHY

ARTHUR EDGAR BURFORD, Ph.D., *Assistant Professor of Geology* (1960).
 ALAN CHASE DONALDSON, Ph.D., *Associate Professor of Geology* (1962), 1957.
 HARRY MARION FRIDLEY, Ph.D., *Professor of Geology* (1943), 1928.
 WILLIAM HARRY GILLESPIE, M.S., *Instructor (part-time) in Geology* (1958), 1957.
 MILTON TIDD HEALD, Ph.D., *Professor of Geology* (1960), 1948.
 JOHN CHARLES LUDLUM, Ph.D., *Professor of Geology* (1956), 1946.
 PAUL HOLLAND PRICE, Ph.D., *Professor of Geology* (1960).
 DANA WELLS, Ph.D., *Chairman and Professor of Geology* (1961), 1930.

HISTORY

WESLEY MARVIN BAGBY, Ph.D., *Chairman and Associate Professor of History* (1962), 1956.
 WILLIAM DERRICK BARNES, Ph.D., *Associate Professor of History* (1954), 1940.
 JOHN ANTHONY CARUSO, Ph.D., *Professor of History* (1962), 1950.
 JASON CLARK EASTON, Ph.D., *Professor of History* (1949), 1938.
 THOMAS EDSON ENNIS, Ph.D., *Professor of History* (1946), 1930.
 JOHN FORD GOLAY, D.PHIL., *Professor of History* (1961).
 DOUGLAS WILLIAM HOUSTON, Ph.D., *Assistant Professor of History* (1961).
 FRANCES CATHERINE KRAUSKOPF, Ph.D., *Assistant Professor of History* (1956).
 MORTIMER LEVINE, Ph.D., *Associate Professor of History* (1961), 1955.
 EDWARD MARVIN STEEL, Ph.D., *Associate Professor of History* (1961), 1956.
 FESTUS PAUL SUMMERS, Ph.D., *Professor of History* (1946), 1932.

LIBRARY SCIENCE

ROBERT FERGUSON MUNN, Ph.D., *Director of University Libraries and Chairman of the Department of Library Science* (1957), 1952.
 FLORENCE KATHERINE REESE, M.A., *Professor of Library Science* (1961), 1935.

MATHEMATICS

CHARLES NELSON COCHRAN, M.S., *Assistant Professor of Mathematics* (1957), 1951.
 ALLEN BYRON CUNNINGHAM, Ph.D., *Professor of Mathematics* (1960), 1946.
 HANNIBAL ALBERT DAVIS, Ph.D., *Professor of Mathematics* (1947), 1924.
 JAMES ROBERT DOSIER, M.A., *Instructor in Mathematics* (1959).
 JOY BROMBERG EASTON, M.S., *Instructor in Mathematics* (1955), 1948.
 BERNARD GILBERT, M.S., *Instructor in Mathematics* (1958).

HELEN LOUISE GODFREY, M.S., *Instructor in Mathematics* (1961).
 HENRY WADSWORTH GOULD, M.A., *Assistant Professor of Mathematics* (1961), 1958.
 LOIS VIVANEEN HEFLIN, M.S., *Instructor in Mathematics* (1956).
 WILMA JEAN LOUDIN, M.S., *Instructor in Mathematics* (1960).
 BETTY LOUISE MILLER, M.S., *Instructor in Mathematics* (1957).
 ILAND DEE PETERS, M.S., *Associate Professor of Mathematics* (1957), 1941.
 JOSEPH KYLE STEWART, PH.D., *Chairman and Professor of Mathematics* (1952), 1930.
 CHARLES HENRY VEHSE, PH.D., *Professor of Mathematics* (1947), 1929.
 MARVIN LEWIS VEST, PH.D., *Professor of Mathematics* (1955), 1931.

PHILOSOPHY AND PSYCHOLOGY

JAMES FRANKLIN CARRUTH, PH.D., *Associate Professor of Psychology* (1957), 1953.
 JOHN REGINALD CRESSWELL, PH.D., *Professor of Philosophy* (1949), 1929.
 ORRIN HARTSHORN CROSS, PH.D., *Associate Professor of Psychology* (1957), 1951.
 QUIN FISCHER CURTIS, PH.D., *Chairman of Philosophy and Psychology and Professor of Psychology* (1949), 1941.
 ROBERT LEE DECKER, PH.D., *Associate Professor of Psychology* (1962), 1955.
 DONALD CHARLES FERGUSON, PH.D., *Assistant Professor of Psychology* (1961).
 WILLIAM SHERMAN MINOR, D.B., *Associate Professor of Philosophy* (1946).
 ROBERT EDWARD RANKIN, PH.D., *Associate Professor of Psychology* (1961), 1954.
 JAMES NICHOLAS SHAFER, PH.D., *Associate Professor of Psychology* (1959), 1953.
 ARTHUR RAYMOND THOMAS, PH.D., *Associate Professor of Psychology* (1962), 1956.

PHYSICS

O. REX FORD, PH.D., *Professor of Physics* (1943), 1925.
 OLEG JEFMENKO, PH.D., *Associate Professor of Physics* (1960), 1956.
 ARTHUR STEPHEN PAVLOVIC, PH.D., *Associate Professor of Physics* (1962), 1959.
 HARVEY NIXON REXROAD, PH.D., *Professor of Physics* (1962), 1947.
 CHARLES DANSER THOMAS, PH.D., *Chairman and Professor of Physics* (1947), 1931.
 WILLIAM EVERETT VEHSE, PH.D., *Assistant Professor of Physics* (1961).
 DOUGLAS BLEEKER WILLIAMSON, ED.D., *Associate Professor of Physics* (1960), 1946.

POLITICAL SCIENCE

CARL MAYNARD FRASURE, PH.D., *Professor of Political Science* (1940), 1927.
 ROBERT C. GIBSON, PH.D., *Assistant Professor of Political Science* (1961).
 DONALD EDWARD HAYHURST, PH.D., *Assistant Professor of Political Science* (1959), 1956.
 GEORGE WESLEY RICE, PH.D., *Assistant Professor of Political Science* (1960).
 WILLIAM ROBERT ROSS, M.A., *Assistant Professor of Political Science* (1948), 1938.
 IRVIN STEWART, PH.D., *Professor of Political Science* (1958), 1946.
 RALPH MILTON WHITE, LL.B., M.A., *Assistant Professor of Political Science* (1951), 1949.
 JOHN RODNEY WILLIAMS, PH.D., *Chairman and Professor of Political Science* (1961), 1949.

SOCIAL WORK

HELEN STEELE ELLISON, M.S.S.W., *Associate in Rehabilitation Social Work* (1961), 1954.
 THOMPSON ROOSEVELT FULTON, A.M., *Professor of Social Work* (1953), 1946.
 THOMAS LOFTUS, M.D., *Lecturer in Social Work* (1962).
 CAROLINE TURTON MUDD, M.S.W., *Assistant Professor of Social Work* (1957).
 BERNHARD SCHER, D.S.W., *Chairman and Professor of Social Work* (1961), 1960.
 WALDO D. WHITNEY, M.S.S.W., *Associate Professor of Social Work* (1957), 1952.

SOCIOLOGY

HAROLD ALLAN GIBBARD, PH.D., *Chairman and Professor of Sociology* (1948).
 HAROLD NEELY KERR, PH.D., *Associate Professor of Sociology* (1959), 1946.

FRED B. SILBERSTEIN, PH.D., *Assistant Professor of Sociology* (1958), 1955.
NEIL J. WELLER, PH.D., *Assistant Professor of Sociology* (1958).

SPEECH

SAM BOYD, JR., M.F.A., *Professor of Speech* (1960), 1943.
ROBERT BARKER BURROWS, M.A., *Associate Professor of Speech* (1960), 1948.
BEVERLY CLAIRE CORTES, M.A., *Instructor in Speech* (1961).
LEONARD MCCUTCHAN DAVIS, PH.D., *Assistant Professor of Speech* (1958), 1954.
JOE EDWARD FORD, M.A., *Assistant Professor of Speech* (1960), 1953.
JAMES HAROLD HENNING, PH.D., *Chairman and Professor of Speech* (1945).
CHARLES DAVID NEEL, M.A., *Instructor in Speech* (1960).
RONALD MICHAEL REED, M.A., *Instructor in Speech* (1961).
WALTER HARRISON ROCKENSTEIN, S.T.M., *Instructor in Speech* (1956).
RAYMOND DOUGLAS STALLARD, M.A., *Instructor in Speech* (1961).
BARBARA SEYLER THOMAS, M.A., *Instructor in Speech* (1961).
LLOYD WASHINGTON WELDEN, SR., M.A., *Professor of Speech* (1961), 1947.

COLLEGE OF COMMERCE

VANCE QUENTIN ALVIS, PH.D., *Professor of Economics* (1960), 1956.
ALLAN JAMES BRAFF, PH.D., *Assistant Professor of Economics* (1959).
THOMAS CORWITH CAMPBELL, PH.D., *Acting Dean of the College of Commerce and Professor of Economics* (1958), 1948.
RAYMOND W. COLEMAN, PH.D., *Professor of Economics and Management* (1948).
EDWIN WILLIAM CROOKS, D.B.A., *Associate Professor of Marketing* (1958), 1954.
CARL DENNLER, JR., PH.D., *Assistant Professor of Accounting* (1957).
LEO FISHMAN, PH.D., *Professor of Economics and Finance* (1952), 1947.
THOMAS WILLIAM GAVETT, PH.D., *Associate Professor of Economics* (1961), 1957.
RAYMOND MICHAEL HAAS, D.B.A., *Assistant Professor of Marketing* (1961).
PAUL W. HAMELMAN, PH.D., *Assistant Professor of Management* (1960).
HAROLD RICHARD HARTZLER, J.D., *Assistant Professor of Business Law* (1959).
THOMAS S. ISAACK, D.B.A., *Professor of Management* (1960), 1951.
MICHAEL K. MISCHAIKOW, PH.D., *Assistant Professor of Economics* (1960).
JOSEPH NEWHOUSE, M.A., *Assistant Professor of Economics and Finance* (1956), 1949.
EVAN OWEN ROBERTS, PH.D., *Professor of Economics and Marketing* (1953), 1939.
CHARLES PRESTON SKAGGS, B.S., C.P.A., *Lecturer in Accounting* (1958), 1954.
ANTHONY H. STOCKS, M.A., *Assistant Professor of Economics* (1961).
JAMES HOWARD THOMPSON, PH.D., *Professor of Economics* (1958), 1948.
VERN HARGRAVE VINCENT, PH.D., C.P.A., *Professor of Accounting* (1957).
FRED EARL WRIGHT, A.M., *Assistant Professor of Finance* (1955), 1951.

COLLEGE OF EDUCATION

HOWARD BUSHNELL ALLEN, PH.D., *Professor of Education* (1932), 1920.
ANDREW KOLB AULT, M.ED., *Instructor in Education* (1961), 1952.
BENJAMIN HASTINGS BAILEY, ED.D., *Associate Professor of Education* (1962), 1959.
LADDIE REED BELL, ED.D., *Associate Professor of Education* (1962).
EARL RUFFNER BOGGS, PH.D., *Dean and Professor of Education* (1960).
THOMAS JOHN BRENNAN, ED.D., *Professor of Education* (1961), 1941.
KERMIT ALDERSON COOK, PH.D., *Professor of Education* (1959), 1935.
GLENNIS HUDKINS CUNNINGHAM, M.A., *Instructor in Education* (1956).
MARSHALL BERNARD GUNSELMAN, M.S., *Assistant Professor of Education* (1961).
DELVIN DAE HARRAH, ED.D., *Associate Professor of Education* (1962).
ARTHUR NEWSOME HOFSTETTER, ED.D., *Professor of Education* (1960), 1955.
STANLEY OLIVER IKENBERRY, PH.D., *Assistant Professor of Education* (1962).
WALTER H. JARECKE, ED.D., *Professor of Education* (1957), 1953.
WILLIAM K. KATZ, M.S., *Assistant Professor of Education* (1959).
EDDIE CLIFTON KENNEDY, ED.D., *Professor of Education* (1957), 1953.

DELMAS FERGUSON MILLER, PH.D., *Professor of Education* (1958), 1950.
ROBERT HUDKINS NEFF, ED.D., *Assistant Professor of Education* (1962), 1956.
JACK DEAN TAYLOR, M.A., *Instructor in Education* (1958), 1957.
WILLIAM VAUGHN WAGNER, ED.D., *Assistant Professor of Education* (1960), 1959.

COLLEGE OF ENGINEERING

AERO-SPACE ENGINEERING

LEON ZEE SELTZER, B.S.E., *Chairman and Professor of Aero-Space Engineering* (1949).
WILLIAM SQUIRE, M.S., *Professor of Aero-Space Engineering* (1961).
BENJAMIN HARRISON ÜLRICH, JR., M.S.A.E., *Associate Professor of Aero-Space Engineering* (1955).

AGRICULTURAL ENGINEERING

EDMOND BYRL COLLINS, M.S.AG.E., *Assistant Professor of Agricultural Engineering* (1962), 1960.
WALTER HOWARD DICKERSON, JR., M.S., *Professor of Agricultural Engineering* (1957), 1953.
ROY EUGENE EMERSON, M.S., *Associate Professor of Agricultural Engineering* (1957), 1940.
ALFRED DELBERT LONGHOUSE, PH.D., *Chairman and Professor of Agricultural Engineering* (1945), 1938.
ROSS ALONZO PHILLIPS, M.S., *Assistant Professor of Agricultural Engineering* (1955).

CHEMICAL ENGINEERING

HAROLD VINCENT FAIRBANKS, M.S., *Professor of Metallurgical Engineering* (1955).
ALFRED FREDDIE GALLI, M.S., *Associate Professor of Chemical Engineering* (1956).
PAUL RUSSELL JONES, M.S., *Professor of Ceramic Engineering* (1957).
JAMES ALBERT KENT, PH.D., *Professor of Chemical Engineering* (1958).
WALTER ALLOS KOEHLER, PH.D., *Professor of Chemical Engineering* (1929).
JOHN FRIEND MAHONEY, PH.D., *Professor of Chemical Engineering* (1960).
HOWARD PERRY SIMONS, PH.D., *Chairman and Professor of Chemical Engineering* (1947).
CHIN-YUNG WEN, PH.D., *Professor of Chemical Engineering* (1959).

CIVIL ENGINEERING

WILFRED HARMON BAKER, M.S.C.E., *Professor of Civil Engineering* (1955), 1941.
JERRY CAMERON BURCHINAL, M.S.C.E., *Professor of Civil Engineering* (1962), 1946.
CHARLES ROBERT JENKINS, M.S., *Assistant Professor of Sanitary Engineering* (1961).
RONALD BRUCE MCPHERSON, M.S.C.E., *Instructor in Civil Engineering* (1960).
ZA LEE MOH, PH.D., *Associate Professor of Civil Engineering* (1962), 1961.
BYRON EDWARD RUTH, M.S.C.E., *Instructor in Civil Engineering* (1961).
JAMES HAMILTON SCHAUB, PH.D., *Chairman and Professor of Civil Engineering* (1960).

ELECTRICAL ENGINEERING

EDWIN CLYDE BARBE, M.S.E.E., *Assistant Professor of Electrical Engineering* (1956).
EVERETTE CHARLES DUBBE, B.S.E.E., *Associate Professor of Electrical Engineering* (1947).
EDWIN CHANNING JONES, M.S.E.E., *Chairman and Professor of Electrical Engineering* (1925).
JOHN BELSHAW KREER, PH.D., *Professor of Electrical Engineering* (1959).
MASON MARCUS PETERSON, B.S.E.E., *Associate Professor of Electrical Engineering* (1948).
MARION JUDSON SMITH, M.S.E.E., *Professor of Electrical Engineering* (1954).

- NELSON STUART SMITH, JR., M.S.E.E., *Assistant Professor of Electrical Engineering* (1956).
 ROBERT EARL SWARTWOUT, M.S.E.E., *Associate Professor of Electrical Engineering* (1962).
 RALPH HOUGH THEOPHILUS, M.ED. *Associate Professor of Electrical Engineering* (1956).

INDUSTRIAL ENGINEERING

- CHARLES CARUTHERS COOK, M.S.I.E., *Assistant Professor of Industrial Engineering* (1960), 1957.
 ROBERT DURANT FOWLER, M.S.I.E., *Associate Professor of Industrial Engineering* (1959).
 RAYMOND EDWIN SHAFER, M.S.I.E., *Chairman and Professor of Industrial Engineering* (1951), 1949.

MECHANICAL ENGINEERING

- JAMES TREAT ANDERSON, PH.D., *Chairman and Professor of Mechanical Engineering* (1960).
 HAROLD MALCOLM CATHER, M.S.M.E., *Professor of Mechanical Engineering* (1945).
 HASAN TAHSEN GENCISOY, M.S.M.E., *Associate Professor of Mechanical Engineering* (1957).
 JEROME FOREST PARMER, M.S.M.E., *Assistant Professor of Mechanical Engineering* (1960).
 ROBERT DEAN SLONNER, M.S.M.E., *Associate Professor of Mechanical Engineering* (1955).

THEORETICAL AND APPLIED MECHANICS

- EDWARD FORD BYARS, PH.D., *Chairman and Professor of Theoretical and Applied Mechanics* (1960).
 CARL HENRY CATHER, M.S.M.E., *Professor of Theoretical and Applied Mechanics* (1948), 1916.
 HELEN LESTER PLANTS, M.S.C.E., *Assistant Professor of Theoretical and Applied Mechanics* (1956), 1947.
 ROBERT WESLEY SHREEVES, PH.D., *Associate Professor of Theoretical and Applied Mechanics* (1961).
 ROBERT DOUGLAS SNYDER, M.S.M.E., *Instructor in Theoretical and Applied Mechanics* (1962).
 GEORGE WILLIAM WEAVER, M.S.M.E., *Professor of Theoretical and Applied Mechanics* (1962), 1948.
 DONALD THOMPSON WORRELL, M.S.E.E., *Professor of Theoretical and Applied Mechanics* (1955), 1941.

SCHOOL OF MINES

- CHARLES THOMAS HOLLAND, M.S.E.M., *Dean of the School of Mines and Professor of Mining Engineering* (1961), 1930.
 RICHARD WILLOUGHBY LAIRD, M.S.E.M., *Associate Professor of Mining Engineering* (1953), 1947.
 JOSEPH DWIGHT MCCLUNG, M.S.E.M., *Associate Professor of Mining Engineering* (1961), 1941.
 ERNEST JAMES SANDY, B.S.E.M., *Assistant Professor of Mining Engineering* (1957), 1947.
 JAMES ALLEN WASSON, M.S., *Assistant Professor of Mining Engineering* (1960).

SCHOOL OF JOURNALISM

- PAUL ALEXANDER ATKINS, M.A., *Associate Professor of Journalism* (1961), 1953.
 DONOVAN HINER BOND, M.A., *Professor of Journalism* (1960), 1946.
 GUY HARRY STEWART, PH.D., *Associate Professor of Journalism* (1960), 1948.
 WILLIAM ROBERT SUMMERS, JR., M.A., *Associate Professor of Journalism* (1960), 1952.

QUINTUS CHARLES WILSON, PH.D., *Dean of the School of Journalism and Professor of Journalism* (1961).

JAMES ROBERT YOUNG, M.A., *Assistant Professor of Journalism* (1954).

MEDICAL CENTER

ANATOMY

WILLIAM RUSSELL GOODCE, PH.D., *Assistant Professor of Gross and Neurological Anatomy* (1961), 1957.

CECIL GORDON HEWES, PH.D., *Associate Professor of Gross and Neurological Anatomy* (1960).

A. CURTIS HIGGINBOTHAM, PH.D., *Associate Professor of Microanatomy* (1957).

ROBERT JOSEPH JOHNSON, M.D., *Chairman and Professor of Gross and Neurological Anatomy* (1957).

RANDALL WILLIAM REYER, PH.D., *Associate Professor of Microanatomy* (1957).

THOMAS WALLEY WILLIAMS, PH.D., *Chairman and Professor of Microanatomy and Organology* (1957), 1944.

BIOCHEMISTRY

WILLIAM THOMAS BURKE, PH.D., *Associate Professor of Biochemistry* (1961), 1960.

WILLIAM JAMES CANADY, PH.D., *Associate Professor of Biochemistry* (1962), 1958.

JERALD LEONARD CONNELLY, PH.D., *Assistant Professor of Biochemistry* (1961).

EDWIN CHARLES GANGLOFF, PH.D., *Assistant Professor of Biochemistry* (1955).

REGINALD FREDERICK KRAUSE, M.D., PH.D., *Chairman and Professor of Biochemistry* (1951).

FREDERICK JACKSON LOTSPEICH, PH.D., *Associate Professor of Biochemistry* (1959), 1955.

DAMON CHARLES SHELTON, PH.D., *Associate Professor of Biochemistry* (1960), 1953

MICROBIOLOGY

ROBERT GUTHRIE BURRELL, PH.D., *Assistant Professor of Microbiology* (1961).

SAMUEL JOSEPH DEAL, PH.D., *Assistant Professor of Microbiology* (1960).

VINCENT FREDERICK GERENCSE, PH.D., *Assistant Professor of Microbiology* (1961).

JOHN EDGAR HALL, PH.D., *Assistant Professor of Microbiology* (1960), 1958.

CARMINE CHARLES MASCOLI, PH.D., *Assistant Professor of Microbiology* (1960).

JOHN MADISON SLACK, PH.D., *Chairman and Professor of Microbiology* (1949), 1946.

PATHOLOGY

WILHELM STOCKMAN ALBRINK, PH.D., M.D., *Chairman and Professor of Pathology* (1961).

EDWARD G. STUART, PH.D., M.D., *Associate Professor of Pathology* (1960).

PHARMACOLOGY

THOMAS DILLARD DARBY, PH.D., *Associate Professor of Pharmacology* (1962).

WILLIAM WRIGHT FLEMING, JR., PH.D., *Assistant Professor of Pharmacology* (1960).

ALEXANDER DONOVAN KENNY, PH.D., *Associate Professor of Pharmacology* (1959).

ROBERT LEO ROBINSON, PH.D., *Assistant Professor of Pharmacology* (1961), 1959.

LEROY HALLOWELL SAXE, JR., PH.D., *Professor of Pharmacology* (1962), 1955.

DANIEL THOMAS WATTS, PH.D., *Chairman and Professor of Pharmacology* (1953).

THOMAS CREED WESTFALL, PH.D., *Instructor in Pharmacology* (1962).

PHYSIOLOGY

WILBERT EUGENE GLADFELTER, PH.D., *Assistant Professor of Physiology* (1961), 1959.

HUGH ALEXANDER LINDSAY, PH.D., *Associate Professor of Physiology* (1960), 1955.

DAVID WILMARTH NORTHUP, PH.D., *Chairman and Professor of Physiology* (1949), 1935.

KENNETH EARL PENROD, PH.D., *Professor of Physiology* (1959).

JOHN CLIFFORD STICKNEY, PH.D., *Professor of Physiology* (1957), 1940.
EDWARD JERALD VAN LIERE, PH.D., M.D., *Professor of Physiology* (1937), 1921.

MEDICINE

EDMUND BERNEY FLINK, M.D., PH.D., *Chairman and Professor of Medicine* (1960).
JOHN JOSEPH LAWLESS, M.D., PH.D., *Associate Professor of Medicine* (1960), 1935.
CLARK KENDALL SLEETH, M.D., *Professor of Medicine* (1961), 1935.

SCHOOL OF PHARMACY

RAPHAEL OTTO BACHMANN, PH.D., *Dean of the School of Pharmacy and Professor of Pharmaceutical Chemistry* (1961).
CHARLES WILLIAM BLISSITT, PH.D., *Assistant Professor of Pharmacy* (1958).
ALFRED CLINTON CORE, PH.D., *Assistant Professor of Pharmaceutical Chemistry* (1961), 1960.
FRANK DENNIS O'CONNELL, PH.D., *Assistant Professor of Pharmacognosy* (1957).

SCHOOL OF MUSIC

CLIFFORD WOODROW BROWN, M.A., *Chairman of Music Education and Professor of Music* (1962), 1941.
WALTER LEE COPLIN, M.M., *Assistant Professor of Music* (1952), 1947.
ARNO PAUL DRUCKER, M.M., *Assistant Professor of Music* (1962), 1959.
RICHARD EDWARD DUNCAN, PH.D., *Dean of the School of Music and Professor of Music* (1958).
CLYDE NEVILLE ENGLISH, D.S.M., *Associate Professor of Music* (1953), 1945.
JOSEPH ARNOLD GOLZ, M.A., *Associate Professor of Music* (1962), 1959.
WILLIAM LUTE GRAVES, MUS.D., *Assistant Professor of Music* (1960).
LEO HORACEK, PH.D., *Associate Professor of Music* (1962), 1960.
FRANK EUGENE KIRBY, PH.D., *Assistant Professor of Music* (1961).
GERALD LEFKOFF, PH.D., *Assistant Professor of Music* (1961).
ELIZABETH ADAMS MCENNEY, M.M., *Assistant Professor of Music* (1949).
BERNARD RONALD MCGREGOR, M.F.A., *Assistant Professor of Music* (1950), 1935.
JANE RHODES PESTUN, M.M., *Instructor in Music* (1945).
DONALD CHARLES PORTNOY, M.A., *Assistant Professor of Music* (1962), 1959.
GEORGE ETHERIDGE SCHAFER, PH.D., *Chairman of Graduate Studies and Professor of Music* (1962), 1954.
JANE C. SCOTT, M.M., *Assistant Professor of Music* (1958).
KENNETH WOOD, M.M., *Associate Professor of Music* (1948), 1928.

SCHOOL OF PHYSICAL AND HEALTH EDUCATION, RECREATION, AND SAFETY

W. QUENTIN BARNETTE, M.A., *Assistant Professor of Physical Education* (1958), 1950.
CHARITY WHITE BETO, M.S., *Associate Professor of Physical Education* (1957), 1946.
KITTIE JEAN BLAKEMORE, M.S., *Instructor in Physical Education* (1960).
WILLIAM ALFRED BONSALE, M.S., *Assistant Professor of Physical Education* (1958), 1950.
WINCIE ANN CARRUTH, PH.D., *Chairman of Women's Physical Education and Professor of Physical Education* (1957).
PHILLIP BARNARD DONLEY, B.S., *CERTIFIED PHYSICAL THERAPIST, Instructor in Physical Education* (1960).
RAY OSCAR DUNCAN, ED.D., *Dean of the School of Physical and Health Education, Recreation, and Safety and Professor of Physical Education* (1952).
ALBERT C. GWYNNE, M.S., *Assistant Professor of Physical Education* (1946), 1934.
STEPHEN HARRICK, M.A., *Associate Professor of Physical Education* (1955), 1924.
JOHN WILLIAM HESEN, M.D., *Assistant Professor of Physical Education* (1959), 1957.
FREDERICK JOHN HOLTER, PH.D., *Chairman of Health Education and Graduate Studies and Professor of Physical Education* (1948), 1947.
BEATRICE HURST, M.A., *Associate Professor of Physical Education* (1951), 1928.
JOSEPH M. HUTCHISON, JR., M.S., *Assistant Professor of Recreation* (1961), 1954.

GEORGE SMITH KING, JR., M.S., *Instructor in Physical Education* (1960), 1958.
JAMES CLIFFORD MARKEL, M.S., *Assistant Professor of Physical Education* (1961).
S. SAMUEL MAURICE, M.S., *Assistant Professor of Physical Education* (1958).
STANLEY EDWARD ROMANOSKI, M.S., *Instructor in Physical Education* (1957).
JOHN GUSTAVE SCHERLACHER, M.Ed., *Chairman and Professor of Recreation* (1960), 1947.
JOHN SEMON, M.S., *Chairman of Department of Physical Education for Men and Associate Professor of Physical Education* (1955), 1943.
PATRICK ANTHONY TORK, M.S., *Professor of Physical Education* (1953), 1943.
MARY KATHRYNE WIEDEBUSCH, B.S., *Instructor in Physical Education* (1955).
CHARLES PETER YOST, Ph.D., *Chairman of Safety Education and Associate Professor of Physical Education* (1958), 1946.

REHABILITATION COUNSELING

GEORGE SAMUEL BROWN, M.S., *Coordinator, Rehabilitation Counseling* (1960).
SHELDON CANFIELD DOWNES, M.S., *Assistant Coordinator, Rehabilitation Counseling* (1962).

GRADUATE FACULTY MEMBERS IN EXTENSION

ERNIE BEVAN McCUE, M.A., *Director of University Extension* (1952), 1947.
ELIZABETH JANE GOODALL, M.A., *History* (1945).
FRANCIS HILL McCLUNG, M.S., *Assistant Professor of Education* (1956).
JAMES WILLIAM WRIGHT, M.A., *Sociology* (1947).

Part IV

COURSES OF STUDY

ABBREVIATIONS

- I—a course given in the first semester.
- II—a course given in the second semester.
- I, II—a semester course given in each semester.
- I and II—a course given throughout the year.
- S—a course given in the Summer Session.
- SI—a course given in the first term of the Summer Session.
- SII—a course given in the second term of the Summer Session.
- hr.—number of credit hours per course.
- rec.—recitation period.
- lab.—laboratory period
- conc.—concurrent registration required.
- PR.—prerequisite.
- consent—consent of instructor required.

NOTE: Summer courses carry the same credit values as courses offered in the regular semesters.

PLAN FOR NUMBERING COURSES

Courses 200 to 299—Courses open to graduate and upper-division undergraduate students.

Courses 300 to 399—Courses open to graduate students only.

AGRICULTURE

AGRICULTURE

THE DEGREE OF MASTER OF AGRICULTURE

Students who seek the degree of Master of Agriculture must hold the degree of bachelor of science in agriculture, or its equivalent, from an approved institution. The program of study leading to this degree is arranged to insure diversification along broad general lines rather than specialization in a single field of subject matter. Course work in at least five such fields must be included and a problem report carrying not more than three semester hours of credit is required. A minimum total number of 30 hours, including the three hours for the problem report, is required. Subject matter fields are those listed in the *Announcements* of the College of Agriculture, Forestry, and Home Economics.

AGRICULTURE

360. PROBLEM REPORT FOR THE DEGREE OF MASTER OF AGRICULTURE, I, II, S. 1-3 hr. Staff

STATISTICS

211. STATISTICAL METHODS. I. 3 hr. Statistical concepts and methods applied to data in biological and other fields. Measure of centrality and dispersion; normal distribution; population and sampling; estimation and tests of hypotheses concerning means and variance; analysis of variance, regression and correlation; enumeration statistics. Mr. Dunbar
212. ADVANCED STATISTICAL METHODS. II. 3 hr. PR: Stat. 211 or equiv. Continuation of Stat. 211. Statistical concepts and methods. Analysis of variance with two or more variables; factorial comparisons; covariance; multiple regression; and curvilinear regression. Mr. Dunbar

- 320, 321, 322, 323. SPECIAL TOPICS. I, II. 2-4 hr. PR: Consent. Advanced study in such topics as analysis of non-orthogonal data, estimation of variance and covariance components, transformation for normality of distribution, efficiency of experiments, and non-parametric methods of estimation. (Students are cautioned to check with their advisers regarding the amount of credit in Special Topics which will be allowed in their respective programs.) Mr. Dunbar

AGRICULTURAL BIOCHEMISTRY AND NUTRITION*

Work for the degree of Master of Science consists chiefly of course offerings selected according to the special needs of the students from 200 and 300 courses in the basic and biological sciences. A total of no fewer than 30 hours of graduate credit is required of which no more than 6 may be for thesis or research. A thesis is required.

Candidates for the master of science degree with a major in agricultural biochemistry should have training in general chemistry, analytical chemistry, organic chemistry, physical chemistry, and biochemistry. All beginning graduate students who expect to become candidates for an advanced degree must take examinations in the above fields of chemistry during the week preceding their first registration. Deficiencies demonstrated by these examinations are to be removed by satisfactory completion of an approved course in that subject-matter area.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Applicants for the degree of doctor of philosophy must have a M.S. or M.A. degree and pass comprehensive written and oral examinations in biochemistry and one or two minor fields. The applicant does not become a candidate for the degree until he has successfully passed the language examinations and the comprehensive examinations. These examinations must be passed one academic year before the degree is conferred.

OPPORTUNITIES FOR RESEARCH

An active research program is in operation in the department. Problems in the fields of nutrition, proteins, the chemistry of microorganisms, and carbohydrates are currently being investigated. The laboratories are well equipped and adequate to accommodate additional graduate students. Several graduate assistantships are available each year.

202. INTRODUCTORY BIOCHEMISTRY. II. 3 hr. PR: General chem., organic chem. Open only to Education majors and Master of Agriculture candidates. Mr. Reid
290. GENERAL BIOCHEMISTRY. I. 3 hr. PR: Organic chemistry, quantitative analysis and consent. A general course in biochemistry primarily intended to meet the needs of graduate students. Staff
291. GENERAL BIOCHEMISTRY. II. 3 hr. PR: Agr. Biochem. 290 or consent. A continuation of Agr. Biochem. 290. Mr. McLaren
293. LABORATORY EXPERIMENTS IN BIOCHEMISTRY. I. 2 hr. PR: Agr. Biochem. 290 or concurrent registration. Experiments to demonstrate certain phases of the subject matter covered in General Biochemistry. Offered in 1964-65 and alternate years. Staff
301. ENZYMES. I. 3 hr. PR: Agr. Biochem. 290 or consent. A general survey of the chemistry of enzymes for the advanced student. Offered in 1962-63 and every third year. Mr. Luchsinger
303. BIOCHEMISTRY OF CARBOHYDRATES. I. 2 hr. PR: Agr. Biochem. 291. The structure, properties, and metabolism of sugars and polysaccharides. Offered in 1963-64 and every third year. Mr. McLaren
306. NUTRITION LABORATORY METHODS. I. 3 hr. PR: Agr. Biochem. 291. Quantitative methods in animal nutrition research. Offered 1963-64 and every third year. Mr. McLaren

*See also the course offerings in medical biochemistry, chemistry, botany, and zoology.

307. NUTRITIONAL BIOCHEMISTRY. I. 3 hr. PR: Agr. Biochem. 291. The biochemistry of protein and amino acid nutrition, and non-protein nitrogen metabolism in the ruminant. Offered 1964-65 and every third year. Mr. McLaren
310. NUTRITION AND PHYSIOLOGY OF THE RUMINANT. II. 3 hr. PR: An. Sci. 100, 101, Agr. Biochem. 290. A study of the nutrition of physiological processes peculiar to the ruminant animal. Offered 1963-64 and alternate years. Mr. Reid and Mr. Anderson
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-4 hr. Advanced training will be provided, through literature surveys and special research projects, in such areas of biochemistry as carbohydrates, lipids, proteins and amino acids, biochemical techniques, animal nutrition and metabolism. Staff
325. ADVANCED BIOCHEMISTRY LABORATORY. I. 2 hr. PR: Agr. Biochem. 290 or concurrent registration. Methods and techniques in the study of proteins and related subjects, including principles of fractionation, electrophoresis, ion exchange, lyophilization, microbiological analysis, and other applicable techniques. Offered in 1963-64 and alternate years. Staff
326. ADVANCED BIOCHEMISTRY LABORATORY. II. 2 hr. PR: Agr. Biochem. 290. Special techniques used in the study of enzymes, and metabolism such as fractional crystallization, countercurrent distribution, purification of enzymes, kinetic studies, and glass blowing. Offered in 1964-65 and alternate years. Staff
330. MINERAL METABOLISM. II. 3 hr. Agr. Biochem. 291 or consent. A study of the mineral requirements of animals covering metabolism, digestion, absorption, excretion, and genetic influence accompanied by laboratory mineral study methods. Offered in 1964-65 and alternate years. Mr. Patrick
- 350, 351, 352, 353. SEMINAR. I, II. 1 hr. per sem. Staff
- 380, 381, 382, 383. RESEARCH. I, II, S. 1-6 hr. per sem. Staff

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

The Department offers major work for the Degree of Master of Science in Agricultural Economics. A student desiring to take work leading to a master's degree in agricultural economics must have earned a bachelor's degree and present at least 12 hours of undergraduate credit in courses in principles of economics, agricultural economics, farm management, marketing, rural sociology, or related subjects. In general, when a thesis is offered, the program will consist of 24 hours or more of course work and 1 to 6 hours of thesis or research. A suitable number of hours of course work may be substituted for a thesis, bringing the program to a minimum of 30 hours. At least 9 hours of approved course work will be required in the field of general economics.

200. LAND ECONOMICS. II. 3 hr. Classification, development, tenure, use, conservation, valuation and taxation of rural, urban, mineral, forest, water and recreational land resources. Staff
206. FARM PLANNING. I. 3 hr. PR: Senior standing. Principal factors influencing returns on farms; planning use of labor, soil, crops, livestock, buildings, and equipment. Farm visits required. Mr. Toben
230. COOPERATIVE MARKETING. II. 2-3 hr. PR: Agr. Econ. 102 or 103. Principles and practices of cooperation as applied to marketing of agricultural products and to purchase of farm supplies. Offered in 1963-64 and alternate years. Mr. Clarke
235. MARKETING DAIRY PRODUCTS. II. 2 hr. PR: Agr. Econ. 102 or 103. Milk-marketing policies and practices, including federal milk-market orders. Offered in 1964-65 and alternate years. Mr. Clarke
240. AGRICULTURAL PRICES. II. 3 hr. An analysis of the price-making forces which operate in the market places for the major agricultural commodities. Mr. Clarke

261. AGRIBUSINESS FINANCE. I. 3 hr. Credit needs of agricultural businesses; financing of farm and market-agency firms; and organization of credit agencies which finance agricultural business firms. Mr. Armentrout
271. AGRICULTURAL POLICY. II. 2 hr. An examination of the economic aspects of government price programs, production and marketing controls, subsidies, parity, export and import policies, and other programs affecting agriculture. Offered in 1964-65 and alternate years. Mr. Armentrout
- 320, 321, 322, 323. SPECIAL TOPICS. I, II. S. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; maximum credit, 6 hr.) Staff
340. ADVANCED FARM MANAGEMENT. I. 3 hr. PR: Agr. Econ. 206. Mr. Toben
341. PRODUCTION ECONOMICS. I. 3 hr. Economic principles of production with special applications to agriculture. Staff
342. ADVANCED AGRICULTURAL ECONOMICS. II. 3 hr. Mr. Armentrout
- 380, 381, 382, 383. RESEARCH. I and II. 1-6 hr. per sem. Staff

AGRICULTURAL EDUCATION

Candidates for the Master of Science Degree with major in Agricultural Education must have done satisfactory work as undergraduates. The student's candidacy must be approved by the chairman of the department. Candidates for the master's degree in agricultural education must have fulfilled the requirements for B.S. Agr. at West Virginia University or at an approved institution offering an equivalent degree. Also, the candidate must have completed a minimum of 20 hours in education and 50 hours in agriculture.

Students shall combine graduate courses in agriculture and in education by taking 16 to 20 hours in agriculture and 10 to 14 hours in education. A minimum of 5 hours shall be in professional courses dealing with agricultural education. All graduate courses offered toward a degree must have prior approval of the adviser. The student and the adviser shall arrange a specific curriculum to be pursued for the degree at the beginning of the graduate program. A thesis or problem is required as a part of the 30 hours for graduation.

Students shall complete in residence 15 hours of course work after having completed one or more years of teaching vocational agriculture. This shall apply unless the student has been granted permission by the Department to complete his graduate work without teaching experience.

- ED. 276. TEACHING YOUNG AND ADULT FARMER CLASSES. I, SI. 2 hr. PR: Ed. 105, 106. Participation in conducting young and adult farmer classes and school-community food preservation center; organization, course of study, methods of teaching and supervision of the classes, and young farmers' associations. Mr. Butler and Staff
- ED. 277. ORGANIZING AND DIRECTING SUPERVISED FARMING PROGRAMS. I, SI. 2 hr. PR: Ed. 160 or consent. Planning programs of supervised farming, supervising and evaluating such programs for all-day students, young and adult farmer classes and groups. Mr. Kelly or Mr. McGhee
- ED. 318. PLANNING PROGRAMS AND COURSES FOR VOCATIONAL AGRICULTURE DEPARTMENTS. II, SI. 2 hr. PR: Ed. 160, 124. Gathering data, studying the farming problems of day students, young farmers and adult farmers, and formulating total programs for school communities. Mr. Butler
239. PROGRAM BUILDING IN AGRICULTURAL EXTENSION. II. 3 hr. PR: Agr. Educ. 134, 138, or consent. Rural organization in relation to program building. Leadership and group action. Over-all working and educational objectives. Principles, methods, and goals in developing county extension programs. Mr. Harvey and Mr. Sizer
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 1-4 hr. (For the Master's Degree, Special Topics ordinarily may count for 2 to 4 hr.; maximum credit, 6 hr.) Staff

- 350, 351, 352, 353 SEMINAR. I, II, SI. 1 hr. Mr. Butler
 360. PROBLEM. I, II, S. 1-3 hr. (For the Master's Degree). Staff
 380, 381. RESEARCH. I and II. S. 1-6 hr. per sem. Staff

AGRICULTURAL ENGINEERING

See Page 141.

AGRICULTURAL MECHANICS

200. RURAL WATER SUPPLY AND SANITATION. I. 2 hr. PR: Ag. E. 10. Pump principles, planning installations of water systems, and sewage disposal systems. 1 hr. rec., 3 hr. lab. Mr. Emerson
 252. ADVANCED FARM MECHANICS. II. 3 hr. PR: Agr. Mech 152. Forging, cold-iron work, tool fitting, woodworking. Offers training for teaching shop work in rural high schools. 1 hr. rec., 6 hr. lab. Mr. Emerson
 253. ADVANCED FARM MACHINERY. II. 3 hr. PR: Ag. E. 10. Performance of agricultural equipment including calibration, efficiency, adjustments, and maintenance. Theoretical and practical aspects of selection based on economics, compatibility of machines with other equipment and the farming operation, service, and factors of custom operation. 2 hr. rec., 3 hr. lab. Mr. Phillips
 254. FARM MAINTENANCE AND CONSTRUCTION WELDING. II. 3 hr. PR: Ag. E. 10. Characteristics and properties of metals used in farm machinery and equipment. Machinery repair, including oxacetylene cutting and welding. AC and DC electric. 1 hr. rec., 6 hr. lab. Mr. Emerson
 255. CARE AND REPAIR OF HOME EQUIPMENT. II. 2 hr. For advanced undergraduate and graduate students. Construction, maintenance, and repair of household equipment; their comparative cost and economic use. 1 hr. rec., 3 hr. lab. Mr. Emerson
 259. FARM STRUCTURES. I. 3 hr. PR: Ag. E. 10. Fundamentals of construction, functional requirements, materials, new equipment, and use of laborsaving ideas and machinery. 2 hr. rec., 3 hr. lab. Mr. Longhouse and Mr. Elliott
 270. ELECTRICITY IN AGRICULTURE. I. 3 hr. PR: Ag. E. 10 and Math. 4. The study of the fundamentals of electrical energy and its application to lighting, power, heating, and control circuits used in agriculture. 2 hr. rec., 3 hr. lab. Mr. Collins
 275. AGRICULTURAL ENGINES. II. 3 hr. PR: Ag. E. 10. Relation of theory to design and operation of internal combustion engines with emphasis on care, operation, and maintenance. Study covers one, two, three, four, six and eight cylinder engines, both in two and four stroke cycle designs. 2 hr. rec., 3 hr. lab. Mr. Longhouse and Mr. Elliott
 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; maximum credit, 6 hr.). Staff
 380, 381. RESEARCH. I and II. 1-6 hr. per sem. Staff

AGRONOMY AND GENETICS

The Department of Agronomy and Genetics offers major work for the degrees of Master of Science and Doctor of Philosophy in the fields of crops, soils, and genetics, and minor work for students in other fields.

Adequately equipped laboratories and greenhouses are provided. The Agronomy Farm and substation are available for certain types of investigational work.

To enter upon graduate work the student should have basic courses in the physical and biological sciences in addition to basic courses in agronomy and genetics. Students who have not had such courses will be required to take these without credit early in their graduate work. In addition to courses in their major field,

students will be expected to acquire training in one or more related minor fields, the nature of the courses selected depending on their particular field of interest. Research will deal with problems of soil science, crop science, or genetics. A thesis or problem report is required for the M.S. degree.

AGRONOMY (CROP SCIENCE)

251. WEED CONTROL. I. 3 hr. PR: Agr. 52 and Agron. 2 or consent. Fundamental principles of weed control. Recommended control measures for and identification of common weeds. 2 lec., 1 lab. Mr. Veatch
252. GRAIN AND SPECIAL CROPS. II. 3 hr. PR: Agr. 52 and Agron. 2 or consent. Advanced study of methods in the production of grain and special crops. Varieties, improvement, tillage, harvesting, storage, and uses of crops grown for seed or special purposes. Offered in 1964-65 and alternate years. Mr. Veatch
254. PASTURE AND FORAGE CROPS. II. 4 hr. PR: Agr. 52 and Agron. 2 or consent. All phases of pasture and forage crop production, including identification, seeding, management, use, seed production, and storage of forage crops. 3 lec., 1 lab. Mr. Jung

AGRONOMY (SOIL SCIENCE)

210. FERTILIZER AND SOIL FERTILITY. I. 3 hr. PR: Agron. 2 or 10. Soil properties in relation to fertility and productivity of soils; evaluation of soil fertility; production of fertilizers and their use in increasing the fertility and productivity of soils. Mr. Baughman
212. SOIL MANAGEMENT. II. 3 hr. PR: Agron. 2 or 10. Using soil technology to solve soil management problems relating to cropping systems. Field diagnosis of soil problems will be stressed. Two half-day farm visits. Offered in 1964-65 and in alternate years. Mr. Jencks
216. SOIL GENESIS AND CLASSIFICATION. II. 3 hr. PR: Agron. 2 or 10. Origin and formation of soils. Study of soil profiles and soil forming processes in the fields and laboratory. Principles of classification and techniques of soil mapping. 2 lec., 1 lab. Offered in 1963-64 and alternate years. Mr. van Eck
230. SOIL PHYSICS. I. 3 hr. PR: Agron. 2 or 10. Physical properties of soils, water and air relationships and their influence on soil productivity. Offered in 1964-65 and alternate years. 2 lec., 1 lab. Mr. Baughman
316. SOIL CHEMISTRY. I. 3 hr. PR: Consent. Fundamental chemical properties of soils in relation to plant growth; nature and properties of soil colloids; base exchange and soil acidity; availability of plant food elements and soil-plant interrelationships. Offered in 1963-64 and alternate years. Mr. Jencks

AGRONOMY (CROP AND SOIL SCIENCE)

- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; maximum credit, 6 hr.). Staff
- 350, 351, 352, 353. SEMINAR. I, II. 1 hr. per sem. Recent literature pertaining to soil and crop production. Staff
- 380, 381, 382, 383. RESEARCH. I, II. 1-6 hr. per sem. Staff

GENETICS

220. CROP BREEDING. II. 3 hr. PR: Gen. 111 or 221. Methods and basic scientific principles involved in the improvement of leading cereal and forage crops through hybridization and selections. Offered in 1963-64 and alternate years. Mr. Veatch
221. GENETICS. I. 3 hr. PR: 8 hr. in biological science. Fundamental principles of inheritance. Mr. Sarkissian
222. ADVANCED GENETICS. II. 3 hr. PR: Gen. 111 or 221 and consent. Mr. Sarkissian

224. HUMAN GENETICS. II. 2 hr. PR: Gen. 111 or 221. A study of inheritance in man. Mr. Ulrich
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; maximum credit, 6 hr.). Staff
- 350, 351, 352, 353. SEMINAR. I, II. 1 hr. per sem. Recent literature pertaining to breeding, genetics, and cytology. Staff
- 380, 381, 382, 383. RESEARCH. I, II. 1-6 hr. per sem. Staff

ANIMAL AND VETERINARY SCIENCE

Advanced study leading to a Master of Science Degree is offered in animal nutrition, physiology, breeding and management, meats technology, and in parasites and diseases of domestic animals. Candidates for advanced work should have had basic training in chemistry, zoology, genetics, physiology, mathematics, and animal science. Deficiencies in these areas must be corrected without credit.

All candidates will be required to prepare a thesis based upon a research problem related to their major area of interest.

202. ADVANCED MEATS. II. 3 hr. (2 labs.). PR: A.V.S. 167. Studies covering complete correlation of animal types, quality and finish as against carcass yields, percentage, cuts, etc. Mr. McBee
260. PARASITES AND PATHOLOGY. II. 3 hr. PR: Biol 1 and 2 or equiv. Common parasites of farm animals, their control, and their effect upon the host. Mr. Olson
223. ADVANCED LIVESTOCK PRODUCTION. I. 3 hr. (1 lab.). PR: A.V.S. 101. Phase of beef production involving problem work in specialized commercial purebred fields, including processing. Mr. Kidder
224. ADVANCED LIVESTOCK PRODUCTION. II. 3 hr. (1 lab.). PR: A.V.S. 101. Special studies in wool and market-lamb production, including processing. Mr. Welch
225. REPRODUCTION OF FARM ANIMALS. II. 3 hr. PR: Gen. 221 or consent. The anatomy and physiology of reproduction in farm animals. Mr. Kidder
226. BREEDING OF FARM ANIMALS. II. 3 hr. PR: Gen. 221 or consent. The application of principles of quantitative population genetics to the improvement of farm animals. Mr. Mitchell
303. ADVANCED ANIMAL NUTRITION. II. 3 hr. PR: A.V.S. 101 and Chem. 131 or 233. Chemistry of feeding stuffs and of the animal body, as well as of digestion and metabolism of food nutrients. Offered in 1963-64 and alternate years. Mr. Horvath
310. NUTRITION AND PHYSIOLOGY OF THE RUMINANT. II. 3 hr. PR: A.V.S. 100, 101, Agr. Biochem. 190. A study of the nutrition and physiological processes peculiar to the ruminant animal. Offered in 1963-64 and alternate years. Mr. Reid
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 1-4 hr. (1 hr. credit in special cases only.) Advanced study in such topics as vitamins, minerals, and internal secretions in relation to health, growth, reproduction, and newer studies in the field of animal nutrition and breeding. (For the Master's Degree, Special Topics ordinarily may count 2-4 hr.; maximum credit, 6 hr.). Staff
- 350, 351, 352, 353. SEMINAR. I, II. 1 hr. Mr. Anderson
370. METHODS OF ANIMAL RESEARCH. (With Dairy and Poultry Science). I. 3 hr. Research methods used in animal nutrition and breeding. Offered in 1964-65 and alternate years. Messrs. Anderson, Mitchell, and Patrick
- 380, 381, 382, 383. RESEARCH. I, II. 1-6 hr. per sem. For graduate students working on a problem in preparation of a thesis. Staff

DAIRY SCIENCE

Before taking graduate work in Dairy Science, the student should have completed the equivalent of the courses listed in the *Announcements* of the College of Agriculture, Forestry, and Home Economics as curricular requirements for undergraduate students in Dairy Science, or must pass a satisfactory examination qualifying him for further study. It is important that students have inorganic and organic chemistry, physics, biology, mathematics, and economics. In addition, those taking Dairy Foods must have had the undergraduate courses in Dairy Foods and should have additional chemistry.

In obtaining the degree of Master of Science in Dairy Science, a student can specialize in the following: dairy cattle nutrition, dairy cattle breeding, dairy cattle management, cell physiology, milk plant management, properties of milk and its products, and milk technology. IBM data may be used when available. Students may be required to take courses in colleges other than agriculture. A thesis is required.

204. ADVANCED DAIRY TECHNOLOGY. II. 4 hr. Chemical and bacteriological methods used in the technical control of milk and milk products. Offered in 1964-65 and alternate years. Mr. Thomas
222. MILK PRODUCTION. II. 4 hr. Feeding and management of dairy cattle. Mr. Rakes
225. REPRODUCTION OF FARM ANIMALS. II. 3 hr. PR: Gen. 221 or consent. The anatomy and physiology of reproduction in farm animals. (Not open to those having credit for A.V.S. 225). Mr. Kidder
226. BREEDING OF FARM ANIMALS. II. 3 hr. PR: Gen. 221 or consent. The application of principles of quantitative population genetics to the improvement of farm animals. (Not open to those having credit for A.V.S. 226). Mr. Mitchell
227. MILK SECRETION. II. 3 hr. PR: Chem. 31, Dairy Sci. 225. The evolution, anatomy and growth of the mammary gland. The chemical, hormonal, physiological and environmental factors affecting lactation. Staff
230. MARKET MILK PRODUCTS AND FROZEN DESSERTS. I. 4 hr. The assembling, processing, packaging, storing and merchandising of dairy products. (Does not carry graduate credit for a student majoring in Dairy Foods.) Offered in 1964-65 and alternate years. Mr. Weese
231. BUTTER, CHEESE AND CONCENTRATED MILK PRODUCTS. II. 3 hr. Manufacture of butter, concentrated milk products, and various types of cheese. Offered in 1963-64 and alternate years. Mr. Weese
312. CRITICAL EVALUATION OF RECENT RESEARCH AND DEVELOPMENT IN DAIRY FOODS. I. 4 hr. PR: Consent of instructor. Normally a minimum of Agr. Biochem. 218, Bact. 246 and at least one Dairy Foods course will be required. Methods, results and impact of recent research and developments pertaining to dairy food industry. Offered in 1964-65 and alternate years. Mr. Thomas
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-4 hr. Advanced study in such topics as vitamins, minerals, and internal secretions in relation to health, milk production, and new studies in the field of animal nutrition and breeding. (For the Master's Degree, Special Topics ordinarily may count for 2-4 hr.; maximum credit, 6 hr.). Staff
326. ADVANCED ANIMAL SELECTION. II. 3 hr. PR: Agron. 212 and Gen. 221, or equiv. Mr. Mitchell
330. ADVANCED MILK PRODUCTION. II. 3 hr. PR: Dairy Sci. 101 or equiv. Advanced study of the feeding, breeding, and management of dairy cattle. Mr. Ackerman and Mr. Rakes
- 350, 351, 352, 353. SEMINAR. I, II. 1 hr. Dairy, poultry, and animal science. Staffs
370. METHODS OF ANIMAL RESEARCH. (With Animal and Poultry Science). I. 3 hr. Research methods used in animal nutrition and breeding. Offered in 1964-65 and alternate years. Messrs. Anderson, Patrick, and Staff

380, 381, 382, 383. RESEARCH. I, II. 1-6 hr. per sem. For graduate students working on problems in preparation of a thesis. Staff

FORESTRY

THE DEGREE OF MASTER OF SCIENCE IN FORESTRY

Graduate students in Forestry must have completed a four-year forestry curriculum and hold a Bachelor's Degree from an approved college.

A candidate for the Master of Science in Forestry Degree must pass satisfactorily 30 credits of approved work, of which 6 may be for a thesis. A thesis is required.

222. ADVANCED MENSURATION. II. 3 hr. PR: Math. 2, For. 21, 106, and consent. The application of statistical methods to forest mensuration including the development of sampling theory as applied to forestry; with emphasis on the measurement and theory of volume growth and yield of forest trees and stands. Staff
227. FOREST MANAGEMENT PLANS. II. 2 hr. PR: For. 123 or equiv. A study of the function and preparation of forest management plans with emphasis on the construction of a sustained yield timber management plan for a specific forest area. Mr. Goodspeed
311. ENVIRONMENTAL RELATIONSHIPS IN HARDWOOD FORESTS. I. 3 hr. PR: For. 112. The study of environmental factors affecting establishment, composition, and growth of hardwood forests. Mr. Tryon
312. SILVICULTURAL PRACTICES FOR HARDWOOD FOREST TYPES. II. 3 hr. PR: For. 112, 116. Designing proper silvicultural systems for managing Appalachian hardwood stands; reconstructing stand histories, recognizing problems, and prescribing appropriate silvicultural treatment. Mr. Carvell
- 320, 321. SPECIAL TOPICS. I, II. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; maximum credit, 6 hr.). Staff
- 350, 351. SEMINAR IN SILVICULTURE. I, II. 2 hr. Staff
- 380, 381, 382. RESEARCH. I, II. S. 1-6 hr. per sem. Staff

HOME ECONOMICS

THE DEGREE OF MASTER OF SCIENCE IN HOME ECONOMICS EDUCATION

Candidates for the Master's Degree in Home Economics Education must have fulfilled the requirements for a B.S.H.E. Degree at West Virginia University or at an approved college offering an equivalent degree. In addition, the candidate must have completed a minimum of 14 hours in Education and 36 hours in Home Economics as an undergraduate.

The required curriculum leading to the Degree of Master of Science in Home Economics Education is as follows:

Option A or B

Education	10-20 hr.
Home Economics	10-20 hr.
(Problem or Thesis required)	
Tributary Fields	0-10 hr.
Total	30 hr.

Option C

Education	10-20 hr.
Home Economics	10-20 hr.
A minimum of work outside the field of education	10 hr.
Total	36 hr.

Those electing to obtain the Master's Degree by Option C shall be required to take comprehensive written examinations. These examinations shall be furnished by:

1. Each of two or three staff members in the major area. Each examination will require approximately two hours to answer (a total of 4 to 6 hours).
2. Each of two members of the staff in minor fields. These examinations will require one and one-half hours to answer (a total of 3 hours).

Candidates for advanced degrees must declare their intentions of working toward an advanced degree and petition for admission to candidacy after having completed 10 hours of graduate work on the West Virginia University campus with no more than six hours in extension or by transferred credit or both.

Any candidate undertaking to write a problem report or a thesis must elect Home Econ. 309.

Whenever a candidate enrolls for courses offered through the West Virginia University Extension Division, she shall do so on the basis of having obtained prior written approval from her adviser.

Whenever a candidate elects work in another institution with the expectation of transferring the credit to West Virginia University, she shall do so only with the approval of her adviser and the Dean of the Graduate School, well in advance of matriculation for such work.

A minimum of 6 hours shall be taken in courses open to graduate students only, that is, courses in the 300 series. These shall be in addition to Ed. 360 or Ed. 361.

Qualifying examinations may be required of students who come to West Virginia University for graduate work for the first time.

No student may receive the M.S.H.E.Ed. Degree who does not have a 3.0 (B) average in the major field.

One graduate assistantship is available in Teacher Education and Child Development. Terms of employment correspond to those in the College of Agriculture, Forestry, and Home Economics.

THE DEGREE OF MASTER OF HOME ECONOMICS

Students who seek the degree of Master of Home Economics must have fulfilled the requirements for the degree of Bachelor of Science in Home Economics or for the Bachelor of Arts with a major in home economics at West Virginia University or at an approved institution offering an equivalent degree.

The curriculum is planned to meet the needs of those who wish training beyond the bachelor's degree in order to be better qualified for the professional work. It provides for breadth of training rather than for specialization in a narrow subject-matter area. After completing 10 hours of graduate work on the West Virginia University campus, the student should apply to the Graduate Committee in the Division of Home Economics for admission to candidacy. At this time, the student shall present a brief outline of the proposed problem for study. When the student is admitted to candidacy, the graduate committee, in conference with the student and her adviser, will select three staff members to serve as an advisory and examining committee.

To insure breadth of training, students enrolled in this curriculum shall take work in at least five subject-matter areas in home economics, with a maximum of 10 credit hours in any one field. A maximum of 10 credit hours may be taken in other colleges at the University.

The student shall plan her work in advance with the help of her adviser, selecting courses which will help her perform better the work which she plans to do. Prior approval must be obtained from the adviser for all courses offered in fulfillment of degree requirements, whether they be taken in residence or by extension.

For the Master of Home Economics degree the subject-matter fields shall be those listed in the *Announcements* of the College of Agriculture, Forestry, and Home Economics. At present these fields are: foods and nutrition, institution management, textiles and clothing, applied art, health and child care, home management, and home economics education.

THE DEGREE OF MASTER OF SCIENCE IN HOME ECONOMICS WITH A MAJOR IN CHILD DEVELOPMENT

This program is designed to permit students to do advanced study and original research in the field of child development. Students pursuing this program should be competent to direct nursery schools.

To enter this program the student must have a baccalaureate degree from an approved institution with sufficient background in child development, family life,

and education to qualify for admission to graduate courses in this area. Students must show evidence of the ability to undertake a graduate program and give promise of proficiency in the fields.

The satisfactory completion of a minimum of 30 credit hours of graduate work approved by the adviser and the graduate committee of the Division of Home Economics shall be required. These shall include at least 6 hours, exclusive of research, to be taken in courses open to graduates only. No more than 6 research credits may be applied to the minimum credit requirements. The required curriculum shall include:

Home Economics Courses	10-15 hr.
Courses in Allied Fields	10-15 hr.
Cognate Courses	6-10 hr.

An acceptable written thesis based upon individual research and the approval of an examining committee following an oral examination on the thesis shall be required before the candidate is recommended for the degree.

THE DEGREE OF MASTER OF SCIENCE IN HOME ECONOMICS WITH A MAJOR IN HUMAN NUTRITION

The students who seek the degree of Master of Science in Home Economics with a major in Human Nutrition must have received the baccalaureate degree from an approved institution. They should have sufficient background in nutrition, chemistry, biochemistry and physiology to qualify for admission to graduate courses in these areas. They must give evidence of ability to undertake a graduate program and give promise of proficiency in the field.

The satisfactory completion of a minimum of 30 credit hours of graduate work approved by the adviser is required. At least 6 credit hours shall be in courses open to graduate students only. No more than 6 hours credit in research may be applied to the minimum credit requirement. The required curriculum will include the following courses:

Home Economics	10-15 hr. (major field)
Allied Sciences	10-15 hr. (minor field)
Electives in supporting fields	6-10 hr.

A written comprehensive examination planned by the examining committee of at least three faculty members representing the major and minor areas of concentration; the presentation of an acceptable written thesis based upon individual research; and the approval by the examining committee following an oral examination on the thesis will be required before the degree is granted.

201. DIET THERAPY. I. 3 hr. PR: Home Econ. 101, Zool. 171, Biochem. 139. Adaptations of normal diet for diseases whose prevention or treatment is largely influenced by diet. Offered in 1964-65 and alternate years. Miss Yearick
205. EXPERIMENTAL COOKERY. II. 3 hr. PR: Home Econ. 15, Chem. 131. 1 hr. lec., two 2-hr. lab. Utensils, ingredients, temperature, manipulation, and cooking methods as they affect quality of cooked products. Offered in 1964-65 and alternate years. Mrs. Jones
206. OBSERVATION AND PARTICIPATION IN THE NURSERY SCHOOL. II. 1-2 hr. PR: Home Econ. 106. Directed experience in working with children in a nursery-school situation. Laboratory and conference. Offered in 1964-65 and alternate years. Miss Brown and Mrs. Ayersman
209. EVALUATION IN HOME ECONOMICS. II. 3 hr. PR: 30 hr. of home economics, 7 hr. of Education. Experience in selecting, devising, and using evaluation devices for appraising student progress toward desired goals in home economics education. Miss Brown
211. READINGS IN NUTRITION. II. 1-4 hr. PR: Consent. Reviews of current literature and present research. Topics depend upon needs and interest of class members. Offered in 1964-65 and alternate years. Miss Yearick
212. ADVANCED CLOTHING CONSTRUCTION. II. 2 hr. PR: Home Econ. 233 or consent. Offers opportunity for creative expression and for understanding of pat-

tern through handling of fabrics on dress form. Costumes are designed, draped, and constructed. Staff

214. FAMILY ECONOMICS. I. 3 hr. PR: 30 hr. of home economics. Management of family's money resources. Consideration of economic problems of families, of planned spending and saving, and of the roles of the consumer. Staff
215. FOOD PRESERVATION. I. 2 hr. PR: Home Econ. 15, Bact. 141, or equiv. 1 hr. lec., 2 hr. lab. Fundamental principles involved and actual experiences in various methods of food preservation. Offered in 1963-64 and alternate years. Mrs. Jones
217. READING IN TEXTILES. I. 2 hr. PR: Home Econ. 17. Review and discussion of current literature reporting recent research in the field. Offered in 1964-65 and alternate years. Staff
219. ADULT EDUCATION IN HOMEMAKING. II. 3 hr. PR: 30 hr. of home economics and 7 hr. of education. Current trends and present activities. Organization of adult classes; development of unit outlines; consideration of teaching methods; illustrative material and bibliography. Miss Noer
221. COMMUNITY NUTRITION PROBLEMS. II. 2 hr. PR: Home Econ. 101 or consent. One 2-hr. lec., field work. Includes consideration of organizations through which these problems may be solved. Offered in 1963-64 and alternate years. Staff
222. TAILORING. II. 3 hr. PR: Home Econ. 2, 17. Tailoring of suits and coats. Emphasis placed on professional techniques, advanced fitting and construction of garments. Second garment constructed by fast-method techniques. Staff
224. FAMILY AND INDIVIDUAL IN THE COMMUNITY. I. 3 hr. PR: One course in the Family, or Sociology, or consent. Social psychological analysis of the individual in the family and in other social systems. Involves the study of role relationships, community processes and attitudes and values as they affect the behavior of the individual. Mrs. Nolan
231. NUTRITION EDUCATION FOR ELEMENTARY TEACHERS. I, S. 2 hr. PR: Consent. Fundamental principles of human nutrition with special emphasis on the needs of children. The laboratory period will be used for evaluation and development of instructional aids and teaching units. Staff
233. COSTUME DESIGN. I. 2 hr. PR: Home Econ. 3, 12, 117. Techniques of figure and fashion drawing. Designing for individuals of various types and ages. Some history of costume included. Staff
234. HOME MANAGEMENT LABORATORY. I, II. 3 hr. PR: Home Econ. 15, 106, 114; 115 recommended. Arranged. A residence course designed to provide opportunity to apply management in a realistic homemaking situation, to develop satisfying relationships in a family-like atmosphere, and to use information and skills learned in other courses. Staff
249. HISTORY OF HOME ECONOMICS. I. 1 hr. One lecture. Miss Noer
254. HOUSEHOLD EQUIPMENT. II. 2 hr. PR: Senior standing. Selection, arrangement, use and care of equipment for various situations and for different income levels. Laboratory and discussion. Staff
264. FAMILY DEVELOPMENT. II. 3 hr. PR: Home Econ. 114 or consent. A professional course designed to prepare students for work with families in their varying states of development and different socio-economic levels. Involves intensive study of family relationships as affected by differing stages of family life cycle from beginning family through the aging couple. Lecture, discussion and observation of families. Mr. Taylor
266. NEEDS OF ADOLESCENTS. I. 3 hr. A study of adolescent needs as met by the home with contributions of other agencies such as church, school and youth

groups. Physical, social and integrative needs will be considered from the standpoint of needs of all family members as well as the individual.

276. SEMINAR IN CHILD DEVELOPMENT. II. 2 hr. PR: Senior standing; Home Econ. 106. Recent literature pertaining to Child Development. Offered in 1963-64 and alternate years. Miss Brown
279. SEMINAR IN HOME ECONOMICS EDUCATION. I. 2 hr. PR: Senior standing and 6 hr. of education. Recent literature pertaining to home economics education at the junior and senior high school levels and to the college and adult levels. Miss Noer
281. PROBLEMS IN NUTRITION. I, II. 1-4 hr. PR: Consent. Staff
282. PROBLEMS IN CLOTHING. I, II. 1-4 hr. PR: Consent. Staff
283. PROBLEMS IN RELATED ART. I, II. 1-4 hr. PR: Consent. Staff
284. PROBLEMS IN HOME MANAGEMENT. I, II. 1-4 hr. PR: Consent. Staff
285. PROBLEMS IN FOODS. I, II. 1-4 hr. PR: Consent. Staff
286. PROBLEMS IN CHILD DEVELOPMENT. I, II. 1-4 hr. PR: Consent. Staff
287. PROBLEMS IN TEXTILES. I, II. 1-4 hr. PR: Consent. Staff
288. PROBLEMS IN INSTITUTION MANAGEMENT. I, II. 1-4 hr. PR: Consent. Staff
301. GRADUATE NUTRITION SEMINAR. I, II. 1-4 hr. PR: Home Econ. 101 and consent. Recent progress in nutrition research. Offered in 1963-64 and alternate years. Miss Yearick
309. RESEARCH METHODS. I, II, S. 2 hr. Adaptation of research techniques to problems in home economics. For students writing problems, theses or research reports. Must be taken at West Virginia University. Miss Brown
319. HOME ECONOMICS CURRICULUM. II. 3 hr. PR: Experience in teaching home economics and consent. Selection and organization of learning experiences in home economics. Practices and techniques currently used for curriculum planning and reconstruction. Offered in 1963-64 and alternate years. Miss Noer
329. SUPERVISION IN HOME ECONOMICS. II. 2 hr. PR: Teaching experience and consent. Designed for home economics teachers preparing to serve as supervising teachers in "off-campus" training centers. Function of supervision and organization of supervised teaching program. Techniques for helping students in training for teaching homemaking. Offered in 1964-65 and alternate years. Miss Brown
360. PROBLEM REPORT FOR THE DEGREE OF MASTER OF HOME ECONOMICS. I, II, S. 1-3 hr. Staff
361. NUTRITION RESEARCH. II. 6 hr. PR: Home Econ. 101, Chem. 6 or 106, and consent. Research in foods and/or nutrition. Miss Yearick
376. THESIS FOR THE DEGREE OF MASTER OF SCIENCE IN HOME ECONOMICS WITH A MAJOR IN CHILD DEVELOPMENT. I, II. 6 hr. PR: Home Econ. 309 and consent. Miss Brown
389. PROBLEMS IN HOME ECONOMICS EDUCATION. I, II. 1-4 hr. PR: Consent. Staff

HORTICULTURE

The candidate for the degree of Master of Science should offer a minimum of 30 semester hours properly distributed among the related sciences and his major field.

Departments offering graduate courses of special interest and value to students of horticulture are: botany, chemistry, genetics, soils, plant pathology, economics, education, and entomology. A thesis is required.

206. SMALL-FRUIITS PRODUCTION. I. 3 hr. A practical and scientific study of standard cultural practices in the small-fruits plantation. Mr. Childs

208. APPLICATION OF SPRAYS, DUSTS, AND FUMIGANTS. II. 2 hr. PR: Entom. 202 or Pl. Path. 103 and Hort. 1, 2, or 229 (1 lec., 1 lab.). Training in the use of machinery and materials in the application of fungicides, insecticides, hormones, and plant nutrients to horticultural crops. Development and interpretation of spray schedules. Mr. Marsh and Mr. Adams
212. COMMERCIAL TREE-FRUIT PRODUCTION. I. 3 hr. Latest methods in pruning, spraying, soil culture, and other production practices for fruit trees from the practical and scientific standpoint. Mr. Schubert
229. LANDSCAPE DESIGN. I. 3 hr. (1 lec., 1 scheduled lab, 1 arranged lab.). A course in ornamental horticulture giving an appreciation of the basic principles of design and information pertaining to the use and care of ornamental plants around the home. Mr. Fortney
232. COMMERCIAL VEGETABLE PRODUCTION. II. 2 hr. PR: Hort. 1. Current methods of commercial vegetable production, including equipment, soil and climatic adaptation, plant raising, soil culture, harvesting, grading, and packing. Mr. Westover
234. LABORATORY INSPECTION TRIP. II. 1 hr. PR or conc: Hort. 232. Three-day inspection trip in connection with Hort. 232. Mr. Westover
239. ADVANCED LANDSCAPE DESIGN. I. 3 hr. PR: Hort. 140, 229, or consent. Advanced studies in landscape design. Mr. Fortney
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count for 2 to 4 hr.; maximum credit, 6 hr.). Staff
- 380, 381, 382, 383. RESEARCH. I, II, S. 1-6 hr. per sem. (Maximum credit, 6 hr.). Staff

PLANT PATHOLOGY, BACTERIOLOGY, AND ENTOMOLOGY

Candidacy. Graduate students in Plant Pathology, Bacteriology, or Entomology must hold a Bachelor's Degree from an approved college. To enter upon graduate work without condition in these fields, the student must have passed satisfactorily not less than 32 hours in biology. Additional undergraduate work in chemistry, physics, mathematics, or botany may be required according to the needs of the field of specialization followed by the student. Admission to candidacy is conditioned upon a suitable period in residence and a demonstrated ability to do work of graduate caliber.

Course requirements. A candidate for the Master's Degree in Plant Pathology, Bacteriology, or Entomology must pass satisfactorily 30 credits of approved work of which 6 may be for a thesis. A thesis is required.

The doctorate is offered only in Plant Pathology and Agricultural Microbiology and candidates for these degrees are governed by the general regulations on page 28.

AGRICULTURAL BACTERIOLOGY

246. DAIRY BACTERIOLOGY. I. 4 hr. PR: Bact. 141. Microorganisms in market milk, in manufacture of butter, cheese, and fermented milk, and in milk hygiene; practice in preparation of media; making bacterial counts in milk. Offered in 1964-65 and alternate years. Mr. Koburger
248. SANITARY BACTERIOLOGY. I. 3 hr. PR: Bact. 141. Standard bacteriological methods used in routine examination of water sewage. Offered in 1963-64 and alternate years. Mr. Wilson
314. SOIL MICROBIOLOGY. II. 4 hr. PR: Bact. 141 and organic chemistry. Occurrence and distribution of microorganisms in soils and their interrelationships. Their role in decomposition of organic matter and other transformations of soil constituents. Offered in 1964-65 and alternate years. Mr. Wilson
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; maximum credit, 6 hr.). Staff

- 350, 351. SEMINAR. I, II, 1 hr. per sem. Staff
- 380, 381, 382, 383. RESEARCH. I, II, S. 1-6 hr. per sem. Staff

ENTOMOLOGY

202. AGRICULTURAL ENTOMOLOGY. II. 4 hr. PR: Biol. 1, 2. A course dealing with the basic aspects of insect life, emphasizing the study of economically important insects and their control. Designed to meet the needs of students in agriculture. Does not carry graduate credit for majors in Entomology.
Mr. Dorsey
203. ECONOMIC ENTOMOLOGY. II. 3 hr. PR: Entom. 202. Evaluation of insect control problems; study of survey and control methods; equipment; insecticides. Offered in 1964-65 and alternate years. Staff
313. INSECT TRANSMISSION OF PLANT DISEASES. I. 3 hr. PR: Pl. Path. 153, 201, or Entom. 202. Role of insects in spread and development of plant diseases. Offered in 1963-64 and alternate years. Mr. Leach
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-6 hr. PR: Entom. 202. Advanced study of entomological topics of special interest to the student. Staff
- 350, 351. SEMINAR. I, II. 1 hr. per sem. Staff
- 380, 381, 382, 383. RESEARCH. I, II, S. 1-6 hr. Staff

PLANT PATHOLOGY

201. GENERAL PLANT PATHOLOGY. I. 4 hr. PR: Bact. 141. Nature and causes of plant diseases; methods of control.
Mr. Leach and Mr. Elliott
202. PRINCIPLES OF PLANT PATHOLOGY. II. 4 hr. PR: Bact. 141 and either Pl. Path. 152, 201, or 203, or consent. Primarily for graduate students and seniors majoring in botany, biology, or agricultural science. Nature of diseases in plants with practice in laboratory methods. Offered in 1963-64 and alternate years.
Mr. Leach, Mr. Gallegly, and Staff
203. MYCOLOGY. I. 4 hr. Lectures, field and laboratory studies of parasitic and saprophytic fungi. Mr. Barnett
204. DISEASES OF FRUIT CROPS. I. 2 hr. PR: Pl. Path. 201. The important diseases of commercial fruits. Causes and methods of control. Offered in 1964-65 and alternate years. Mr. Adams
205. DISEASES OF ORNAMENTALS. II. 2 hr. PR: Pl. Path. 201 or 153. The important diseases of ornamentals. Causes and methods of control. Offered in 1963-64 and alternate years. Mr. Elliott
206. DISEASES OF VEGETABLE CROPS. II. 2 hr. PR: Pl. Path. 201. The important diseases of potatoes and vegetable crops. Causes and methods of control. Offered in 1964-65 and alternate years. Mr. Gallegly
207. DISEASES OF FIELD AND FORAGE CROPS. II. 2 hr. PR: Pl. Path. 201. The important diseases of cereals, legumes, and grasses. Causes and methods of control. Offered in 1964-65 and alternate years. Mr. Elliott
208. APPLICATION OF SPRAYS, DUSTS, AND FUMIGANTS. II. 2 hr. PR: Entom. 202 or Pl. Path. 201 and Hort. 1, 2, or 229, or its equiv. One lecture and one laboratory. Training in the use of machinery and materials in the application of fungicides, insecticides, herbicides, hormones, and plant nutrients to horticultural crops. Also the development and interpretation of spray schedules.
Mr. Adams and Mr. Marsh
209. NEMATOLOGY. I. 3 hr. PR: Pl. Path. 201 or consent. Primarily for graduate students majoring in the agricultural sciences, zoology, or botany. Nematode taxonomy, bionomics, and control, with particular emphasis on plant parasitic forms. Offered in 1964-65 and alternate years. Mr. Adams

313. INSECT TRANSMISSION OF PLANT DISEASES. I. 3 hr. PR: Pl. Path. 153, 201, or Entom. 202. Role of insects in spread and development of plant disease. Offered in 1963-64 and alternate years. Mr. Leach
315. ADVANCED FOREST PATHOLOGY. II. 3 hr. PR: Pl. Path. 203 and either Pl. Path. 153 or Pl. Path. 201. Principles, substance, and application of our knowledge of tree diseases and decays, especially as they may be related to forest management practices. Offered in 1963-64 and alternate years. Mr. True
- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; maximum credit, 6 hr.). Staff
330. PHYSIOLOGY OF THE FUNGI. II. 4 hr. PR: Organic chem., mycology, and bact., or consent. Physiological aspects of growth, reproduction, and parasitism of fungi, with emphasis on nutrition, environment, and other biotic factors. Mr. Barnett and Mr. Lilly
340. TAXONOMY OF THE FUNGI. I. 3 hr. PR: Pl. Path. 203. Collection and identification of fungi, with emphasis upon those of economic importance. Offered in 1964-65 and alternate years. Mr. Barnett
- 350, 351. SEMINAR. I, II. 1 hr. per sem. Staff
- 380, 381, 382, 383. RESEARCH. I, II, S. 1-6 hr. per sem. Staff

POULTRY SCIENCE

Work for the Master of Science Degree in this Department consists of course offerings selected from 200 and 300 courses in the major fields of poultry science, animal breeding and animal nutrition and in the related fields of agricultural biochemistry, zoology, genetics, biometry and agricultural economics.

Students who desire to enter upon graduate work in poultry breeding should have had the basic courses in zoology or biology, genetics, chemistry, physiology, poultry science, and mathematics. Students desiring to do their major work in poultry nutrition should have completed the basic courses in chemistry, physiology, poultry science, and mathematics. Students who lack these undergraduate requirements will be expected to take the necessary courses without graduate credit early in their graduate programs.

In connection with the graduate program, graduate courses will be required in the fields of zoology, chemistry, genetics, biometry, and poultry science in relation to the major field of study—poultry breeding or poultry nutrition.

A total of no fewer than 30 hours of graduate credit is required of which no more than 6 hours may be for a thesis or research. A thesis is required.

201. ADVANCED POULTRY PRODUCTION. I. 3 hr. PR: P.S. 1 or equiv. for all students; P.S. 103 or A.V.S. 101 for graduate credit. Special phases of broiler and egg production, disease control, labor saving studies, recent designs in building and heating equipment. Mr. Patrick and Mr. Hyre
202. PRINCIPLES OF BIOLOGICAL RADIONUCLIDE SCIENCE. I, S. 3 hr. (1 lab.) PR: Chem. 1 and 2, biology or bacteriology or consent. A course on basic principles of biological radio-chemistry, radiation effects, radionuclide measurements and handling and also tracer methodology. Offered in 1964-65 and alternate years. Mr. Patrick
212. BREEDING AND INCUBATION: PRINCIPLES AND PRACTICES. I. 3 hr. (1 lab.). PR: Gen. 221 or consent. Study of methods available for improving and reproducing meat and egg quality. Offered in 1964-65 and alternate years. Mr. Hyre
213. TURKEY PRODUCTION. I. 3 hr. (1 lab.) PR: P.S. 1 or equiv. for all students; P.S. 103 or A.V.S. 101 for graduate credit. Current methods in turkey production, including varieties, selective breeding, nutrition, and marketing. Offered in 1963-64 and alternate years. Mr. Patrick
214. BIOLOGICAL RADIONUCLIDE METHODS. I, II. 3 hr. PR: P.S. 1, Chem. 1, 2, 131, or consent. Using the chick and radionuclides as applied to chick biological

methods. Radionuclide methods and isotope handling as needed by students interested in research. Mr. Patrick

- 320, 321, 322, 323. SPECIAL TOPICS. I, II, S. 1-4 hr. (1 hr. credit in special cases only). Advanced study in such topics as vitamins, minerals, and internal secretions in relation to health, growth, egg production, reproduction, and newer studies in the field of animal nutrition and breeding. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; maximum credit, 6 hr.).
330. MINERAL METABOLISM. II. 3 hr. (1 lab.) PR: Chem. 1, 2, 31, Biochem. 290-291, or consent. A study of the mineral requirements of animals covering metabolism, digestion, absorption, excretion and genetic influence accompanied by laboratory mineral study methods. Offered in 1964-65 and alternate years. Mr. Patrick
- 350, 351, 352, 353. SEMINAR. I, II. 1 hr. Poultry, animal, and dairy science. Staff

ARTS AND SCIENCES

ART

Candidates for the Degree of Master of Arts in Art must have an undergraduate major or minor in Art, a teaching field in Art, or the equivalent. Before being admitted to candidacy for the degree the student will take a comprehensive examination in the field and a test designed to demonstrate his ability to do graduate work, and any deficiency in preparation must be made up without graduate credit.

Departmental requirements for the degree are as follows:

1. Completion of a minimum of 30 semester hours of graduate work, including not more than 6 hours in thesis or problem.
2. Passage of a written comprehensive examination.
3. Completion of Art 290, Study of Original Works of Art (6 hours).
4. Passage of an oral examination on the thesis or problem.

Of the 30 hours, not more than 9 may be in studio courses.

With the consent of his committee, the student may elect a maximum of 6 hours in a related subject.

211. FIGURE DRAWING. I, II, S. 3 hr. PR: Art. 11 or 111, 12 or 112, and/or consent. Study of the construction of the figure. Drawing from the draped and partially draped model. Mr. Freeman and Staff
213. PAINTING. I, S. 3 hr. PR: Art 113, 117 and consent. First semester advanced watercolor. Messrs. Clarkson, Freedman and Patton
214. PAINTING. I, II, S. 3 hr. PR: Art 213 and consent. Second semester advanced watercolor. Mr. Clarkson or Mr. Freedman
216. PAINTING. II, S. 3 hr. PR: Art 114, 118, and consent. First semester advanced oil painting. Mr. Clarkson or Mr. Freedman
217. PAINTING. I, II, S. 3 hr. PR: Art 216 and consent. Second semester advanced oil painting. Mr. Clarkson or Mr. Freedman
220. ART AND THE SCHOOLS. I, II, S. 2 hr. PR: 4 hr. of art, including a minimum of 2 hr. studio. Miss Drainer
221. ADMINISTRATION AND SUPERVISION OF ART. I, II, S. 2 hr. Art. 220. Mainly for administrators and school principals who wish to become informed about all programs and the philosophies underlying them. Miss Drainer
225. SECONDARY SCHOOL ART. I or II, S. 3 hr. PR: Art 11 or 111, 12 or 112, 121, 122, 113, 114, and consent. Information and working skills desirable for the teaching of art on the secondary school level. Mr. Moss and Staff

241. MEDIEVAL ARCHITECTURE. I, II, S. 3 hr. PR: Art 105, 106. A study of architecture from the time of Constantine to the Renaissance. Mr. Patton
250. RENAISSANCE PAINTING. I, II, S. 3 hr. PR: Art 105, 106. A study of painting in Italy from Cimabue to Tiepolo; the Renaissance in Western Europe; a brief consideration of baroque and rococo painting as outgrowth of the Renaissance. Offered 1964-65 and alternate years. Messrs. Patton and Clarkson
260. MODERN PAINTING. II, S. 3 hr. PR: Art. 105, 106. Developments in painting from the French Revolution to the present day. Messrs. Patton and Clarkson
271. AMERICAN ARCHITECTURE. I, II, S. 3 hr. PR: Art 105, 106. Developments in architecture in North America from Pre-Columbian times to the present day. Emphasis will be placed on the architecture of the United States. Mr. Patton
290. STUDY OF ORIGINAL WORKS OF ART. S. 6 hr. PR: Art 105, 106, and consent. of the Department. Directed study in the museums and libraries of some urban center such as Washington or New York; a study of the architectural developments of the locality. Mr. Patton and Staff
- 350, 351. SPECIAL TOPICS. I, II, S. 1-3 hr. per sem. PR: Consent of the Department. Individual study to be determined by the student's requirements. Staff
- 391, 392. THESIS. I, II, S. 3 hr. per sem. PR: Approval of Student's Committee. Staff

BIOLOGY

The Department of Biology offers work leading to the degrees of Master of Science and Doctor of Philosophy with a major in either botany or zoology. Courses listed under Biology and courses in other departments, schools, and colleges are open, at the discretion of the adviser, to majors in either field, when these courses are available.

Admission. Applications for admission of students seeking advanced degrees should be in the hands of the Registrar of the University, together with transcripts of grades, *at least one month prior to the expected date of registration.* In addition, applicants who wish to qualify for the Ph.D. degree must submit to the Committee on Admissions and Qualifications of the Department of Biology a letter of application which should state reasons for desiring the degree, qualifications for pursuing work for the degree, and the applicant's area of interest within his major subject. These applicants must also submit to the same committee two or more letters of recommendation from former college instructors or from supervisors of previous professional work.

The major adviser will evaluate records of applicants for work toward the master's degree and will inform them of any special requirements which must be met in each case. The Committee on Admissions and Qualifications will evaluate the records, applications, and recommendations of applicants for work toward the doctor's degree and will inform the applicant of its decision. Only a limited number of especially well-qualified students whose interests can be accommodated by the personnel and facilities of the Department will be accepted for work toward the Ph.D. degree.

Requirements for M.S. Degree. Graduate work in botany or zoology should be preceded by the approximate equivalent of the Department's requirements for the A.B. degree. (In botany the undergraduate requirements include biological science, 34-40 hours; organic chemistry; and general physics. In zoology they include biological science, 38 hours; physical and organic chemistry; general physics; and algebra and trigonometry.) The major adviser will assign such of the above courses as may be required to be taken without graduate credit. Further courses will be assigned to round out the student's knowledge and experience in the chief areas of his major subject and to support his research interests. Admission to candidacy for the master's degree is granted after the student completes 12 hours of graduate credit with an average of 3.0 grade points (a grade of B). Completion of a thesis, the result of an original investigation, will also be required. Field courses, offered in summer at Terra Alta Biological Station, or their equivalent, are required of all graduate students. All students are required to attend the Biology Seminar while in

residence. An average of 3.0 grade points (B) must be maintained in all courses taken, whether for graduate credit or not, while the student is a major in the Department.

Final examinations shall be both oral and written. They will be given shortly before the degree is expected. The written examinations will cover the chief areas of the major subject; the oral examination will be devoted to the thesis and may also include the chief areas of the major subject. The student will assume full responsibility for preparing for these examinations, either by taking courses or by independent study and review. Courses so taken which have not been assigned will not necessarily be credited toward the degree.

These requirements are subject to change and prospective students should inquire at the departmental office for possible revision.

The minimum time in which a master's degree may be earned is two semesters and one term of the Summer Session. In most instances more time will be required, depending largely on the student's undergraduate preparation.

Requirements for the Ph.D. Degree. On admission to the Department the student will be assigned a course of study by a specially appointed committee under chairmanship of the staff member who will supervise the research of the student. Courses may be assigned outside the Department and at other institutions at the discretion of this committee. Field courses at Terra Alta Biological Station, or their equivalent, are required unless previously taken. Attendance at the Biology Seminar is also required while the student is in residence. A grade-point average of 3.0 (B) must be maintained in all courses taken either in the Department or elsewhere. Qualification for candidacy and the granting of the degree will be in accordance with the rules of the Graduate School.

BIOLOGY

203. NATURAL HISTORY. S. 3 hr. PR: General biology or equiv. Lectures, demonstrations, and field trips designed to provide a brief survey of certain aspects of general biology suitable for elementary and high schools. Mr. Benson
204. BIOLOGY WORKSHOP. S. 3 hr. PR: Biol. 2 or equiv. Lectures and demonstrations designed to aid the teacher of pre-college biology, and constituting a general review. Mr. Clovis
205. PRINCIPLES OF EVOLUTION. I, S. 3 hr. PR: Biol. 2, Bot. 2, or Zool. 2. An introduction to the study of evolution. Mr. Bennett
206. MODERN CONCEPTS IN BIOLOGY. S. 2-3 hr. PR: Biol. 2 or equiv. A course designed to acquaint the advanced student or teacher with the latest methods and knowledge in the field of biology. The effect of new information in confirming or changing older concepts will be fully explored, with student participation emphasizing different areas. Mr. Clovis
207. HISTORY OF BIOLOGY. I. 3 hr. PR: Biol. 2. History of the development of biological knowledge, with philosophical and social backgrounds. Mr. Core
208. GREAT TEXTS OF BIOLOGY. II. 1 hr. PR: Biol. 2 or equiv. A study of some of the great classics in biology, such as Theophrastus' *Enquiry into Plants*, Vesalius' *Epitome*, Harvey's *Motion of the Heart and Blood*, Darwin's *Origin of Species*, and Mendel's *Experiments on Hybrid Plants*. Mr. Core
209. THE LITERATURE OF BIOLOGY. I. 1 hr. PR: Biol. 2 or equiv. A consideration of the courses and forms of the literature, the development of bibliographies, and the preparation of scientific papers. Mr. Core
210. BIOLOGICAL SCIENCE FOR HIGH SCHOOL TEACHERS. II. 2 hr. PR: Biol. 206 or equiv. A study of demonstrations and laboratory equipment suitable for high schools, and a review of recent developments in the biological sciences. Mr. Clovis
211. MICROTECHNIQUE. I. 3 hr. PR: Biol. 2, Bot. 2 or Zool. 2 or equiv. Theory and practice of making microscopic preparations, etc. Mr. Clovis
212. BIOLOGICAL PREPARATIONS. SI. 3 hr. PR: Biol. 1. Methods for the preparation of microscopic slides and other demonstration materials for high school biology

classes. Emphasis will be on procedures using equipment and reagents commonly available to the teacher. Staff

215. CYTOLOGY. II. 4 hr. PR: Biol. 2. Cells, their structure and functions. Mr. Bennett
221. GENERAL ECOLOGY. I. 4 hr. PR: Biol. 2 or equiv. Study of plants and animals in relation to their environments, with special emphasis on facts and principles involving populations, communities, and ecosystems. Mr. Bradshaw
- 301, 302. SEMINAR. I, II. 1 hr. per sem. Topics of interest to all biologists are considered. All members of the staff and graduate students contribute by the presentation of a report on some scientific activity. Required of all graduate students. Staff members and students in other departments are invited to attend. Staff
311. ADVANCED MICROTECHNIQUE. II. 1-3 hr. PR: Biol. 211 and consent. Staff
- 321, 322. SEMINAR IN ECOLOGY. I, II. 2 hr. per sem. PR: Bot. 221 or Zool. 221 and consent. Selected topics on relations of organisms to environment and on communities of organisms. Staff
- 376, 377. SEMINAR IN PHYSIOLOGY. I, II. 2 hr. per sem. PR: Biol. 274, Bot. 273, Zool. 271, or Pl. Path. 330, and consent. Selected topics on functions common to all organisms. Staff

BOTANY

218. ECONOMICS BOTANY. II. 3 hr. PR: Biol. 2 or Bot. 2. Plants from the standpoint of their value to man. Mr. Clarkson
221. PLANT ECOLOGY. I. 4 hr. PR: Biol. 2 or Bot. 2. Environment relationships of plants. Mr. Baer
224. PLANT COMMUNITIES. SI. 3 hr. PR: Biol. 2 or equiv. Field studies in ecology. Mr. Bennett
227. GEOGRAPHIC BOTANY. I, S. 2 or 3 hr. PR: Bot. 2 or Biol. 2. Study of plant groupings and worldwide distribution of plants. Mr. Core
231. PLANT MORPHOLOGY. I. 4 hr. PR: Biol. 2 or Bot. 2. Development and structure of algae and fungi. Mr. Bennett
232. PLANT MORPHOLOGY. II. 4 hr. PR: Biol. 2 or Bot. 2. Development and structure of bryophytes and vascular plants. Mr. Bennett
235. PLANT ANATOMY. I. 4 hr. PR: Bot. 2 or equiv. Anatomy of seed plants. Mr. Tolbert
250. FRESH WATER ALGAE. I. 4 hr. PR: Bot. 1, 2 or Biol. 1, 2. Taxonomy, cytology, and ecology of aquatic, aerial, and land forms of fresh-water algae. Mr. Bennett
255. BRYOPHYTES. II. 2 hr. PR: Bot. 2 or Biol. 2. Identification of liverworts and mosses. Mr. Clovis
256. VASCULAR CRYPTOGAMS. II. 4 hr. PR: Bot. 1, 2 or Biol. 1, 2. Taxonomy, anatomy, cytology, and ecology of the club-mosses, horsetails, and ferns. Mr. Bennett
261. ADVANCED SYSTEMATIC BOTANY. I. 3 hr. PR: Bot. 161 or equiv. Taxonomy of pteridophytes, gymnosperms and monocotyledons. Mr. Clovis
262. ADVANCED SYSTEMATIC BOTANY. II. 3 hr. PR: Bot. 161 or equiv. Taxonomy of dicotyledons. Mr. Clovis
263. TAXONOMY OF VASCULAR PLANTS. S. 3 hr. PR: Biol. 2 or equiv. Field studies in the taxonomy of higher plants. Mr. Bennett
265. AQUATIC SEED PLANTS. I. 3 hr. PR: Biol. 2 or equiv. Classification, ecology, and economic importance of aquatic seed plants. Mr. Bennett

266. FLORA OF WEST VIRGINIA. II, S. 3 hr. PR: Biol. 2 or equiv. A consideration of the native plant life of the State. Mr. Core
273. PLANT PHYSIOLOGY. I. 4 hr. PR: Biol. 2 or Bot. 2, and Chem. 1 and 2, or equiv. Physico-chemical processes of plants. Mr. Baer
- 296, 297. SPECIAL TOPICS. I, II. 1-4 hr. per sem. PR: Consent. Critical studies of topics to be assigned by the instructor. Staff
316. CYTOTAXONOMY. II. 3 hr. PR: Biol. 2, Bot. 161, Genet. 221, or consent. The determination of phylogenetic relationships of cytological and taxonomic methods. Mr. Bennett
325. EXPERIMENTAL ECOLOGY. II. 2-4 hr. PR: Biol. 1, Bot. 161, and Bot. 221 or equiv. Experiments on environmental relations of plants. Mr. Baer
331. PLANT EMBRYOLOGY. II. 2 hr. PR: Biol. 2 or Bot. 2 and consent. Gametogenesis, syngamy, and embryo development in vascular plants. Mr. Bennett
- 351, 352. PROBLEMS IN PLANT TAXONOMY. I, II. 1-6 hr. Bot. 261, 262, or equiv. Staff
368. AGROSTOLOGY. I. 2 hr. PR: Bot. 161 or equiv. Taxonomy of grasses. Mr. Clovis
374. ADVANCED PLANT PHYSIOLOGY. II. 2-3 hr. PR: Bot. 273 or equiv.; also courses in general physics and organic chemistry. Advanced studies of plant processes and physiological methods. Mr. Baer
- 391, 392, 393, 394. RESEARCH. I, II. 1-6 hr. Staff

ZOOLOGY

210. ANIMAL BEHAVIOR. I. 3 hr. PR: Zool. 2 or equiv. Principles of individual and group behavior. Mr. Taylor
222. FIELD STUDIES OF INVERTEBRATES. S. 3 hr. PR: Biol. 2 or equiv. Taxonomy and ecology of the invertebrates. Mr. Birch
223. FIELD STUDIES OF VERTEBRATES. S. 3 hr. PR: Zool. 2 or equiv. Taxonomy and ecology of the vertebrates. Mr. Birch
224. LIMNOLOGY. I. 5 hr. PR: Zool. 2 or equiv. Physical, chemical, and biological investigations of lakes and inland waters. Mr. Benson
231. COMPARATIVE ANATOMY. I. 5 hr. PR: Zool. 2 or equiv. Organs and systems of various vertebrates, together with other facts of interest concerning these animals. Mr. Gribble, Miss Montiegel and Miss Williams
232. VERTEBRATE EMBRYOLOGY. II. 5 hr. PR: Zool. 2 or equiv. Introductory study of development of vertebrates, based on frogs, fowls, and mammals. Mr. Gribble, Miss Montiegel and Miss Williams
233. COMPARATIVE HISTOLOGY. II. 3 hr. PR: Zool. 231. A comparative study of the tissues of the vertebrates. Miss Williams
235. COMPARATIVE DEVELOPMENTAL ANATOMY. II. 3 hr. PR: Zool. 231. Anatomy and development of the organs and systems of various vertebrates. Mr. Gribble
236. COMPARATIVE NEUROANATOMY. II. 3 hr. PR: Zool. 2, 231. Comparative study of development and anatomy of the nervous systems of the vertebrates. Miss Montiegel
237. OSTEOLOGY. I. 2 hr. PR: Zool. 2 or equiv. Development and anatomy of the skeleton. Miss Williams
250. PRINCIPLES OF ANIMAL SYSTEMATICS. I. 2 hr. PR: Zool. 2 or Biol. 2. The species concept and its interpretation. Taxonomic characters of invertebrates and vertebrates. Mr. Benson
251. INVERTEBRATE ZOOLOGY. I. 4 hr. PR: Zool. 2 or equiv. Advanced study of animals without backbones. Mr. Birch

255. INTRODUCTION TO HUMAN PARASITOLOGY. II. 4 hr. PR: Zool. 2 or equiv. Biological aspects of parasites and other animals of medical importance.
Mr. Taylor
263. ICHTHYOLOGY. I. 3 hr. PR: Zool. 2 or equiv. Ecology, life histories, taxonomy, and distribution of fishes.
Mr. Benson
264. FISHERIES BIOLOGY. II. 4 hr. PR: Zool. 2 or equiv. Principles and techniques of fisheries management with an introduction to the theory of population.
Mr. Benson
265. ORNITHOLOGY. II. 3 hr. PR: Zool. 1 or equiv.; consent. Field and laboratories studies on identification, migration, protection, nesting, and food habits of birds.
Mr. Birch
271. VERTEBRATE PHYSIOLOGY. I. 4 hr. PR: Zool. 2 or equiv. The functions of vertebrate organs and organ systems.
Mr. Norman
272. PHYSIOLOGY OF THE ENDOCRINES. I. 4 hr. PR: General zoology or general biology, comparative anatomy, and organic chemistry. Comparative physiology and endocrine mechanisms. The relation of hormonal and parahormonal agents to chemical coordination, metabolism, growth, development, and sex.
Mr. Norman
- 273, 274. CELLULAR PHYSIOLOGY. I, II. 4 hr. per sem. PR: Biol. 2 or Zool. 2; Chem. 238 and Physics 2. A consideration of the functions common to all forms of living matter.
Mr. Norman
276. COMPARATIVE PHYSIOLOGY. II. 4 hr. PR: Zool. 273 or equiv. A study of the diverse ways in which different kinds of animals meet their functional requirements.
Mr. Goldberg
331. MAMMALIAN ANATOMY. S. 3 hr. PR: Zool. 231, 232, 233, 235, 236 and 237 and consent. The study of the anatomy of selected animals from the regional and sectional approach.
Mr. Gribble
332. ANATOMY OF THE INTEGUMENT. I. 2 hr. PR: Zool. 231, 232, 233, 234, and 235 and consent. An advanced study of the gross, developmental, comparative, microscopic anatomy of the integument and its derivatives. Mr. Gribble
334. ANATOMY OF THE CIRCULATORY AND RESPIRATORY SYSTEMS. II. 3 hr. PR: Zool. 231, 232, 235, and consent. An advanced study of the gross, developmental, and comparative anatomy of the circulatory and respiratory systems.
Mr. Gribble
335. ANATOMY OF THE UROGENITAL SYSTEM. I. 3 hr. PR: Zool. 231, 232, and 235 and consent. An advanced study of the gross, developmental and comparative anatomy of the genital and urinary systems.
Mr. Gribble
336. ADVANCED COMPARATIVE NEUROANATOMY. II. 3 hr. PR: Zool. 231, 232, 233, 236 and consent. An advanced study of the gross, developmental and comparative anatomy of the nervous system.
Mr. Gribble
337. ADVANCED OSTEOLOGY. S. 3 hr. PR: Zool. 231 and 237 and consent. The study of the gross, microscopic, developmental, and comparative anatomy of the skeleton.
Mr. Gribble
338. ANALOGIES AND HOMOLOGIES. I. 3 hr. PR: Zool. 231, 232, 233, 235, 236, 237, 331, 334, 336, and 337, and consent. A detailed study of the analogies and homologies as found in the vertebrates.
Mr. Gribble
339. ANOMALIES AND VARIATIONS. II. 3 hr. PR: Zool. 231, 232, 233, 235, 236, 237, 331, 334, 335, 336, 337, and 338 and consent. A detailed study of the types causes, results and frequency of vertebrate anatomical and developmental anomalies and variations.
Mr. Gribble
351. ADVANCED INVERTEBRATE ZOOLOGY. I, II. 1-4 hr. PR: Zool. 251 and consent.
Mr. Birch
- 391, 392, 393, 394. RESEARCH. I, II. 1-6 hr.
Staff

396, 397. SPECIAL TOPICS. I, II. 1-3 hr. per semester. Critical studies of topics to be determined according to the student's requirements. Staff

CHEMISTRY¹

Candidates for the degree of Master of Science with Chemistry as a major must have had fundamental training in inorganic, qualitative and quantitative analytical, organic and physical chemistry as outlined in the *Announcements* of the College of Arts and Sciences. Beginning graduate students desiring to become candidates for a graduate degree in chemistry must take pre-registration examinations in the above indicated four fields of chemistry during the week preceding registration.

Deficiencies revealed are to be removed by completion of appropriate undergraduate courses and/or satisfactory repetition of the preregistration examinations before the student is accepted as a candidate for a graduate degree.

Differential and integral calculus are required of all candidates. Chem. 208, 301, 343, 367, Journal Meeting and Seminar and a maximum of 6 hours of research leading to a thesis are required for the Master of Science degree. Beyond these requirements students may elect any approved 200 or 300 courses within the department or in other departments in related fields to complete a total of 30 hours. No more than 10 hours may be elected outside the Department of Chemistry.

Applicants for the Degree of Doctor of Philosophy who have not obtained their Master's Degree in Chemistry from the University will be required to satisfy the pre-registration examination requirements for the master's degree. Written evaluation examinations based on the first year of graduate work will be given to all candidates. Comprehensive written examinations in the major and minor fields and an oral examination are required. These examinations should be completed at least one year before the degree is conferred.

Course requirements for the Ph.D. degree are 60 hours, exclusive of the research problem leading to the dissertation. The required courses, in addition to those required for the M.S. degree, are Chem. 302, 345, 368, 383, Journal Meeting and Seminar. Electives may be chosen to complete the total, no more than 15 hours of which, with the adviser's approval, may be taken outside the department. Course work earned for the M.S. degree including a maximum of 6 hours of M.S. research will count toward the total requirement of 60 hours.

201. INTERMEDIATE INORGANIC CHEMISTRY. I. 3 hr. PR: Chem. 6 or 106. Mr. Wilhelm
208. QUANTITATIVE ANALYSIS. I. 3 hr. PR: Chem. 6 (5 hr.); Physics 2 or 112, Math. 5. Mr. Gibson
211. INTERMEDIATE INORGANIC LECTURES. S. 2 hr. PR: 12 hr. of chemistry. Selected topics of modern inorganic chemistry. Offered in 1963 and alternate years. Not for science majors. Staff
212. INTERMEDIATE INORGANIC LABORATORY. S. 2 hr. PR: Chem. 211. Laboratory technique to illustrate material covered in Chem. 211. Offered in 1964 and alternate years. Not for science majors. Staff
214. QUALITATIVE ORGANIC ANALYSIS. I. 3 hr. PR: Chem. 238. Mr. Muth
215. QUANTITATIVE ORGANIC ANALYSIS. II. 3 hr. PR: Chem. 238. Mr. Muth
233. ORGANIC CHEMISTRY. I, II, S. 4-5 hr. PR: Chem. 6 or 15. Required of students who major in chemistry, pre-medicine, chemical and mining engineering. Mr. Lazzell and Mr. Muth
238. ORGANIC CHEMISTRY. II, S. 4-5 hr. PR: Chem. 233. Mr. Lazzell
- 243, 244. SELECTED TOPICS. I, II, S. 1-5 hr. PR: Consent. Staff
247. STEREOCHEMISTRY. I. 2 hr. PR: Chem. 238. Open to seniors. Mr. Winston

¹For information as to courses in chemistry available in the Kanawha Valley Graduate Center of West Virginia University, write to: Director, Kanawha Valley Graduate Center of West Virginia University, Institute, W. Va.

260. PHYSICAL CHEMISTRY. I, S. 4-5 hr. PR: Chem. 233, Physics 2 or 112 and Math. 108. Required of chemistry majors and chemical engineering students, the latter for 4 hours credit. Mr. Collett and Mr. G. A. Hall
261. PHYSICAL CHEMISTRY. II, S. 4-5 hr. PR: Chem. 260. A continuation of Chem. 260. Mr. Collett and Mr. G. A. Hall
262. THE CHEMISTRY OF COLLOIDS. II. 2 hr. PR: Chem. 115 or equiv. Mr. G. A. Hall
264. PHYSICAL CHEMISTRY. I or II. 4 hr. PR: 11 sem. hr. college chemistry. Primarily for NSF fellows. Mr. G. A. Hall
270. PRACTICAL INFRARED SPECTROSCOPY. I or II. 3 hr. PR: Organic chemistry or concurrent registration. Mr. Humphrey
273. CHEMICAL LITERATURE. I, II. 2 hr. PR: Chem. 6 and 238. Open to seniors. Mr. Hickman
274. HISTORY OF CHEMISTRY. II. 2 hr. PR: Chem. 6 or equiv., and organic chemistry. Miss Paul
275. WORKSHOP IN CHEMISTRY, INORGANIC. S. 2 hr. PR: 12 hr. of chemistry. Primarily a refresher course for high school teachers. Not for science majors. Offered in 1964 and alternate years. Staff
276. WORKSHOP IN CHEMISTRY, ORGANIC. S. 2 hr. PR: 4 hr. of organic chemistry. A refresher course primarily for high school teachers. Not for science majors. Offered in 1963 and alternate years. Staff
277. CHEMISTRY OF NATURAL PRODUCTS. II. 2 hr. PR: Chem. 238 or equiv. Mr. MacDowell
278. MODERN CHEMICAL PRINCIPLES. I. 2 hr. PR: Chem. 2 or equiv. Staff
279. MODERN CHEMICAL PRINCIPLES. II. 2 hr. PR: Chem. 2 or equiv. Staff
285. NUCLEAR CHEMISTRY. II. 3 hr. PR: Chem. 2, Math. 107. Mr. Wilhelm
286. INTRODUCTORY MOLECULAR STRUCTURE. I or II. 3 hr. PR: Physics 112 and Chem. 201 or 233. Mr. Graybeal
301. ADVANCED INORGANIC CHEMISTRY. I. 3 hr. PR: Chem. 261. Mr. Hickman
302. ADVANCED INORGANIC CHEMISTRY. II. 3 hr. PR: Chem. 301. Mr. Hickman.
317. POLYMER CHEMISTRY. II. 2 hr. PR: Chem. 238, 261. Mr. Winston
343. ADVANCED ORGANIC CHEMISTRY. I. 4 hr. PR: Chem. 238 or equiv. Mr. Muth
345. THEORIES OF ORGANIC CHEMISTRY. II. 2 hr. PR: Chem. 343. Mr. Muth
350. HETEROCYCLIC CHEMISTRY. II. 2 hr. PR: Chem. 343. Mr Muth
367. ADVANCED PHYSICAL CHEMISTRY. II. 2-4 hr. PR: Chem. 261. Mr. J. L. Hall
368. ADVANCED PHYSICAL CHEMISTRY. I. 2 hr. PR: Chem. 367. Mr. J. L. Hall
369. CHEMICAL KINETICS. II. 2 hr. PR: Chem. 261. Mr. G. A. Hall
370. QUANTUM CHEMISTRY. I. 3 hr. PR: Math. 108, Physics 112, Chem. 261. Discussions of the development and significance of quantum mechanics with applications to chemical problems. Mr. Humphrey
380. ELECTROCHEMISTRY. I or II. 3 hr. PR: Chem. 238, 261. Mr. Collett
383. ADVANCED QUANTITATIVE ANALYSIS. II. 3 hr. PR: Chem. 208, 238, 261. Mr. Gibson
388. VALENCE AND MOLECULAR STRUCTURE. I or II. 2 hr. PR: Math. 108, Physics 112, Chem. 261. Mr. Gibson
389. CHEMICAL THERMODYNAMICS. I. 2 hr. PR: Chem. 261 and Math. 108. Mr. Gibson

390. CHEMICAL THERMODYNAMICS. II. 2 hr. Continuation of Chem. 389. Mr. Gibson
- 391, 392. JOURNAL MEETING AND SEMINAR. I, II. 1 hr. per sem. Required of students working for graduate degrees with major in chemistry. Recommended as a minor for students from other departments. Staff
- 395, 396. SPECIAL TOPICS. I, II, S. 1-3 hr. per sem. Chemistry of carbohydrates, chemical microscopy, crystallography, coordination compounds, unfamiliar oxidation states, inorganic preparations, inorganic polymers, infrared, microwave, and radio-frequency spectroscopy are topics suggested for this course. Staff
- 397, 398, 399. RESEARCH. I, II, S. 1-10 hr. Six hours required for the Master's Degree. Staff

ECONOMICS

A candidate for the Master of Arts degree with major in Economics must have satisfactorily completed a minimum of 18 semester hours of upper division courses in Economics or closely allied subjects at an accredited university or college. He must have satisfactorily completed a course in statistics and have a minimum grade-point average of 2.5 (C+) as an undergraduate. Additional courses, prerequisite for work the student expects to pursue, may be required. Deficiencies in undergraduate preparation must be removed without credit.

A program of courses will be planned by the candidate with his faculty adviser and subject to the approval of the adviser. The M.A. degree requires 30 semester hours of graduate credit, including an acceptable thesis. A minimum of 6 semester hours must be completed in a minor field in liberal arts other than Economics, and of the remainder no fewer than 15 hours must be taken in Economics or approved courses in the College of Commerce. A grade-point average of at least 3.0 (B) is required on all work taken while a graduate student.

Candidates for the M.A. degree with a major in Economics should take the following courses if they have not already completed them:

- ECONOMICS 220—Introduction to Quantitative Analysis
- ECONOMICS 221—Intermediate Economic Theory
- ECONOMICS 222—History of Economic Thought
- ECONOMICS 235—Economic Growth and Business Cycle
- ECONOMICS 241—Public Finance
- ECONOMICS 319—Seminar in Economics

A listing of graduate courses in Economics will be found under the College of Commerce section on page 109.

ENGLISH LANGUAGE AND LITERATURE

To be admitted to the Department of English as a prospective candidate for the degree of Master of Arts, a student is expected to have completed work comparable to the Department's undergraduate requirements for English majors and to present a record distinctly above the average. A student whose undergraduate work fails to meet these standards in quantity or in distribution of courses may be admitted conditionally and proceed to make up undergraduate deficiencies by completing extra work in undergraduate or graduate courses as prescribed by the Department.

Course Requirements: A candidate for the M.A. degree will be expected to complete courses covering the major periods and the works of the major authors of English literature. The minimum requirement is 36 hours of graduate course work. The requirements and the student's program are governed in part by his showing on the comprehensive examination.

If a student chooses to complete work in a related field for a graduate minor, he is expected to complete 8 hours in the minor field.

Thesis: A thesis or Master's essay may be required as a part of the graduate program of any candidate at the discretion of the department. The writing of a thesis is considered to be particularly important to those candidates who anticipate proceeding with more advanced graduate studies. A student who chooses the thesis

option or who is advised to write a thesis will be allowed at least 6 hours of course credit toward his requirements for the degree. He will be assigned to an adviser and thesis director when the field in which the thesis is to be written has been determined. The specific subject should be chosen during the first semester or not later than the second summer term of his enrollment as a graduate student.

Foreign Language Requirement: A candidate for the degree of Master of Arts in English must have completed studies in a foreign language (preferably French or German) equivalent to 12 semester hours of college work. If an applicant does not meet this requirement, he may prepare to meet it through independent study, or otherwise, in order to show a reading knowledge on examination.

222. MODERN AMERICAN BIOGRAPHY. I. 3 hr. A selection of the most significant and interesting biographies and autobiographies of Americans of distinction in literature, the arts, and public life. Miss Page
223. MODERN BRITISH BIOGRAPHY. II. 3 hr. Representative works by such eminent masters of biography as Lytton Strachey, Sir Osbert Sitwell, Lord David Cecil, Sean O'Casey, Hugh Kingsmill, and others. Miss Page
- *224. LITERARY CRITICISM. II. 3 hr. The history of literary criticism from Aristotle to modern times. Staff
225. RECENT LITERARY CRITICISM. I, II. 3 hr. A brief survey of the theories and essays of four major schools of modern criticism and an application of these theories to a novel, a play, and to selected poems and short stories. Mr. Foster
228. ADVANCED GRAMMAR. I, II. 3 hr. A course in descriptive grammar, the parts of speech, constructions, and methods of diagramming. Mr. Bishop
230. HISTORY OF THE ENGLISH LANGUAGE. I. 3 hr. A study of the nature of the language; questions of origins, language families, development, relationships of English as one of the Indo-European languages. Staff
- *231. OLD ENGLISH. I. 3 hr. A study of Anglo-Saxon grammar, with selected readings from the literature of the period. Staff
- *232. BEOWULF. II. 3 hr. PR: English 231. Continuation of the study of Old English; critical reading of *Beowulf*. Staff
234. CHAUCER. I. 3 hr. A study of Chaucer's *Canterbury Tales* and *Troilus and Criseyde*. In addition to an understanding and appreciation of Chaucer's literary work, the student is expected to acquire an adequate knowledge of Chaucer's language. Mr. Brawner
235. SHAKESPEARE. I. 3 hr. A course for undergraduates and graduates in the detailed study of three of Shakespeare's major plays. Mr. Draper
239. SOUTHERN WRITERS. II. 3 hr. Examination of twentieth-century southern essayists, poets, short-story writers, and novelists in relation to the ideological background. Mr. Foster
242. LITERATURE FOR TEACHERS. S. 3 hr. Study and appreciation of selected works of American authors, with special reference to the high-school curriculum. Given usually in the Summer Session. Mr. Hicks
243. LITERATURE FOR TEACHERS. S. 3 hr. Study and appreciation of selected works of English authors. Recommended for teachers of high-school English. Given usually in the Summer Session. Mr. Hicks
- *244. LITERATURE OF THE SIXTEENTH CENTURY. I. 3 hr. Renaissance in England as reflected in literature, with some consideration of the fine arts and other aspects of culture. Mr. Draper and Mr. Pitts
- *245. LITERATURE OF THE SEVENTEENTH CENTURY. II. 3 hr. The struggle between Cavalier and Puritan as reflected in the literature of the age. Mr. Draper

*Given only in alternate years.

- *247. LITERATURE OF THE EIGHTEENTH CENTURY. I. 3 hr. The culture-history of England, 1700-1750, as expressed in social, economic, political, and religious movements, and as reflected in literature. Mr. Draper
- *248. LITERATURE OF THE EIGHTEENTH CENTURY. II. 3 hr. A continuation of English 247, covering the period from 1750-1800. Mr. Draper
249. THE ROMANTIC MOVEMENT. I. 3 hr. The works of Wordsworth, Coleridge, and Keats, together with an introduction to works of scholarship in the field of English Romanticism. Mr. Brawner
250. AMERICAN ROMANTICISM. II. 3 hr. The writings of Ralph Waldo Emerson, Henry David Thoreau, and Nathaniel Hawthorne. A study of the relations of these men to the history of their own time, and of their contributions to American thought and art. Mr. Brawner
- *252. MODERN ENGLISH LITERATURE, 1881-1918. I. 3 hr. A consideration of the revolt against mechanism, the new romanticism, doctrines of action, and contemporary tendencies. Mr. Crocker and Mr. Pitts
- *253. PRE-SHAKESPEAREAN DRAMA. I. 3 hr. A study of the medieval drama from its beginning to the middle of the sixteenth century. Mr. Crocker
- *254. ELIZABETHAN DRAMA. II. 3 hr. A study of the dramatists of the Elizabethan period, exclusive of Shakespeare. Mr. Crocker
- *255. RESTORATION AND EIGHTEENTH CENTURY DRAMA. I. 3 hr. A study of persistent forms and new developments in the drama of the period. Mr. Crocker
256. MODERN DRAMA. II. 3 hr. A study of world drama from Ibsen to the present day, with particular reference to -isms and ideas. Mr. Crocker
257. VICTORIAN POETRY. I. 3 hr. A study of the major Victorian poets—Tennyson, Browning, Arnold, Rossetti, Morris, Swinburne, Fitzgerald, and a few of the later Victorian poets. Mr. Gainer
- *258. VICTORIAN PROSE. II. 3 hr. A study of the non-fictional writings of the great Victorian prose critics: Carlyle, Ruskin, Arnold, Newman, Macaulay, Huxley, Morris. Mr. Gainer
259. DRAMATIC ART OF SHAKESPEARE. II. 3 hr. A study of several of Shakespeare's histories, comedies, and tragedies, showing the chronological development of his art and matters of stage presentation in Shakespeare's age. Mr. Bishop
260. STUDIES IN SHAKESPEAREAN COMEDY. I, II. 3 hr. PR: English 142, or consent. Textual and dramatic study of representative comedies. Mrs. Pettigrew
261. TECHNIQUE OF THE DRAMA. I. 2 hr. A study of dramatic structure, with emphasis upon appreciation. Mr. Crocker
262. STUDY OF SELECTED AUTHORS. (American). I, II. 3 hr. A study of the works of a principal American author, or of more than one, as announced when the course is scheduled. Staff
263. STUDY OF SELECTED AUTHORS. (English). I, II. 3 hr. Study of the works of one or more of the principal English authors, as announced in the schedule when the course is listed. Mr. Johnston, Mr. Stasny, and Staff
264. SPENSER, I. 3 hr. A study of Spenser's poetry, minor poems, and *The Faerie Queene*, forms and sources, purpose of the great epic, social, political, and religious allegory. Staff
265. BYRON AND SHELLEY. II. 3 hr. Reading and study of the works of two poets of the later Romantic Movement, together with works of criticism and scholarship related to the period. Mr. Gainer
267. MILTON. II. 3 hr. A study of all of Milton's poems and of a few selected prose works. Mr. Gainer

270. AMERICAN POETRY. I. 3 hr. A study of the major American poets of the nineteenth and twentieth centuries—Bryant, Poe, Emerson, Longfellow, Whitman, Dickinson, Frost, Eliot. Primary emphasis on their poetry as poetry; background materials minimized. Mr. Foster
272. FOLK LITERATURE. II. 3 hr. A study of the folk ballad, its origin, history, and literary significance, based on Child's collection and on American ballad collections. Mr. Gainer
- *275. THE ENGLISH NOVEL TO THE TIME OF SCOTT. I. 3 hr. A study of the English novel from the 16th century to the time of Scott, showing the development of the novelistic art from early narrative beginnings. Mr. Bishop
- *276. THE ENGLISH NOVEL, 1832-1900. II. 3 hr. A continuation of English 275. The development of the English novel from the early nineteenth century to the beginning of the twentieth century. Mr. Bishop
- *278. TRAGEDY. II. 3 hr. Masterpieces of tragedy from Greek times to modern, with consideration of the changing concepts of tragedy and of the ethical and ideological values reflected in the works of major tragic authors. Mr. Brawner
280. THE MODERN NOVEL. I, II. 3 hr. A study of technical methods employed by the twentieth century novelists. Thorough consideration of Henry James, Joseph Conrad, James Joyce, and others. Mr. Bishop
291. INTRODUCTION TO LITERARY RESEARCH. I, II. 2 or 3 hr. Lectures and exercises in research problems to prepare the student for such work in graduate and professional schools. Mr. Draper
392. SEMINAR. I, II. 2 or 3 hr. PR: Specific courses to be approved by the instructor. A graduate study of particular periods or authors. Staff

FOREIGN LANGUAGES

The Department of Foreign Languages offers graduate study in French, Spanish, German, Latin, and Greek literature and culture, in linguistics, in language teaching methods, and in bibliography. Candidates for the master's degree are accepted in French, Spanish, German, and Latin.

A student who wishes to do graduate work in this area should apply to the chairman of the department, who will act as his adviser until the student becomes a candidate for a graduate degree. Usually, he will be expected to have an undergraduate major in a foreign language, preferably the one in which he proposes to major. He should normally show an average of at least 3.0 (B) in his undergraduate foreign language courses.

A candidate must complete at least 32 graduate hours for a master's degree, 18 to 24 hours of which will be in his major field. A prospective elementary or secondary school teacher must take 2 additional hours in Language Teaching Methods. Six hours of the major work may take the form of a master's thesis. The candidate's committee will make all decisions as to the distribution of courses and the thesis requirement in the light of the student's aims and needs.

FRENCH

217. FRENCH CIVILIZATION. II. 3 hr. PR: 12 hr. of French. Miss Wade
221. THE ROMANTIC MOVEMENT. I. 3 hr. PR: French 115. Mr. Singer
222. FRENCH REALISM. II. 3 hr. PR: French 118. Mr. Singer
226. LITERARY CRITICISM. II. 3 hr. PR: A.B. in French or consent. Mr. Singer
227. GRADUATE READING IN FRENCH. No credit. A special course to prepare Ph.D. candidates for the reading examination in French. Staff
229. LITERATURE OF THE 16TH CENTURY. I. 3 hr. PR: A.B. in French or consent. Mr. McBride

231. PHONETICS AND PRONUNCIATION. II. 3 hr. PR: 18 hr. of French or equiv. Mr. Manning
237. MOLIERE. II. 3 hr. PR: French 115. Mr. Beauchemin
241. FRENCH STRUCTURAL LINGUISTICS. 4 hr. PR: 12 hr. of French. A special course for the NDEA Language Institute. Staff
242. METHODS IN FRENCH SECONDARY TEACHING. 4 hr. PR: 12 hr. of French. A special course for the NDEA Language Institute. Staff
244. EXPLICATION DE TEXTES. II. 3 hr. PR: 18 hr. of French or equiv. Mr. Manning
271. THE MODERN NOVEL TO 1930. I. 3 hr. PR: A.B. in French or consent Mr. Frere
272. THE NOVEL AFTER 1930. II. 3 hr. PR: A.B. in French or consent. Mr. Frere
292. PRO-SEMINAR IN FRENCH LITERATURE. 1-6 hr. Special topics. Staff
301. THESIS. 3-6 hr. Staff
392. SEMINAR IN FRENCH LITERATURE. 1-6 hr. Special topics. Staff

SPANISH

211. NINETEENTH CENTURY LITERATURE TO 1870. I. 3 hr. PR: Spanish 3 and 4, or equiv. Mr. Singer
212. SPANISH LITERATURE SINCE 1870. II. 3 hr. PR: Spanish 3 and 4, or equiv. Mr. Singer
215. LYRIC POETRY. I. 3 hr. PR: 12 hr. of Spanish, or equiv. Mr. Herrera
216. SPANISH CIVILIZATION AND CULTURE. I. 3 hr. PR: 12 hr. of Spanish, or equiv. Mr. Herrera
217. SPANISH-AMERICAN LITERATURE AND CULTURE. I. 3 hr. PR: Spanish 3 and 4, or equiv. Staff
218. SPANISH-AMERICAN LITERATURE AND CULTURE. II. 3 hr. PR: Spanish 3 and 4, or equiv. Continuation of Spanish 217. Staff
221. LITERATURE OF THE GOLDEN AGE TO 1635. I. 3 hr. PR: 18 hr. of Spanish, or equiv. Mr. Herrera
222. THE GOLDEN AGE AFTER LOPE DE VEGA. II. 3 hr. PR: 18 hr. of Spanish, or equiv. Mr. Herrera
223. ESTUDIOS DE ESTILO. I. 3 hr. PR: 18 hr. of Spanish, or equiv. Staff
224. EXPLICATION DE TEXTOS. II. 3 hr. PR: 18 hr. of Spanish, or equiv. Staff
225. THE PICARESQUE NOVEL. I. 3 hr. PR: 12 hr. of Spanish, or equiv. Mr. Herrera
227. GRADUATE READING IN SPANISH. No credit. A special course to prepare Ph.D. candidates for the reading examination in Spanish. Staff
241. SPANISH STRUCTURAL LINGUISTICS. 4 hr. PR: 12 hr. of Spanish. A special course for the NDEA Language Institute. Staff
242. METHODS IN SPANISH SECONDARY TEACHING. 4 hr. PR: 12 hr. of Spanish. A special course for the NDEA Language Institute. Staff
291. CERVANTES. II. 3 hr. PR: A.B. in Spanish or consent. Mr. Singer
292. PRO-SEMINAR IN SPANISH LITERATURE. 1-6 hr. Special topics. Staff

295. SIXTEENTH CENTURY LITERATURE. I. 3 hr. Staff
 297. PRO-SEMINAR IN SPANISH-AMERICAN STUDIES. 1-6 hr. Special topics. Staff
 301. THESIS. 3-6 hr. Staff
 392. SEMINAR IN SPANISH LITERATURE. 1-6 hr. Special topics. Staff
 397. SEMINAR IN SPANISH-AMERICAN STUDIES. 1-6 hr. Special topics. Staff

GERMAN

201. INDEPENDENT READING. I. 3 hr. Supervised reading for students who wish to do intensive work in any field of interest. Mr. Lemke
 202. INDEPENDENT READING. II. 3 hr. Continuation of German 201. Mr. Lemke
 227. GRADUATE READING IN GERMAN. No credit. A special course to prepare Ph.D. candidates for the reading examination in German. Staff
 242. FAUST. II. 3 hr. Critical study of Goethe's *Faust*. Mr. Lemke
 243. MEDIEVAL GERMAN LITERATURE. I. 3 hr. PR: German 4 or consent. Mr. Stilwell
 244. GERMAN LITERATURE OF THE REFORMATION AND RENAISSANCE. II. 3 hr. PR: German 4 or consent. Mr. Stilwell
 245. CLASSICISM AND ROMANTICISM. I. 3 hr. PR: German 4 or consent. A critical study of German literature from 1750 to 1830. Mr. Lemke
 246. THE LIBERAL AGE. II. 3 hr. PR: German 4 or consent. A critical study of German literature from 1830 to 1880, with an emphasis upon poetic realism. Mr. Lemke
 247. THE AGE OF CRISIS. II. 3 hr. PR: German 4 or consent. A critical study of German literature from 1880 to the present. Mr. Lemke
 265. GERMAN CIVILIZATION. I. 3 hr. PR: 12 hr. of German or consent. A general comprehensive survey of the most important aspects of German culture, including a brief historical background, the development of the German language, geography, science, music, art, architecture, literature, and philosophy. Mr. Lemke and Mr. Stilwell
 275. THE MODERN NOVEL. I. 3 hr. PR: 18 hr. of German. Supervised reading of nineteenth century novels. Mr. Lemke
 276. THE MODERN NOVEL. II. 3 hr. Continuation of German 275, with emphasis on recent fiction. Mr. Lemke
 292. PRO-SEMINAR IN GERMAN LITERATURE. 1-6 hr. Special topics. Staff
 301. THESIS. 3-6 hr. Staff
 392. SEMINAR IN GERMAN LITERATURE. 1-6 hr. Special topics. Staff

LATIN

201. THE STORY AND NOVEL. I. 3 hr. PR: Latin 109, 110, or equiv. The origin of the story and novel is traced from Homer to the Medieval Greek and Latin romance writers. Selections from Petronius, the *Cena Trimalchionis*, and from Apuleius, *Cupid and Psyche*. Mr. Boggess
 202. DRAMA. II. 3 hr. PR: Latin 109, 110, or equiv. A brief history of the origin and development of Greek and Roman drama. The *Menaechni* of Plautus, the *Andria* of Terence, and the *Medea* of Seneca are read in Latin. Mr. Boggess
 203. ORATORY. II. 3 hr. PR: Latin 109, 110, or equiv. A survey of Greek and Roman oratory is given and part of the first book of Cicero's *De Oratore*;

selections from Quintilian's *Institutes* and from Tacitus' *Dialogue de Oratoribus* are read in Latin. Mr. Boggess

227. GRADUATE READING IN LATIN. No credit. A special course to prepare Ph.D. candidates for the reading examination in Latin. Staff
231. SATIRE. II. 3 hr. PR: Latin 109, 110, or equiv. Greek satirical writings and the origin of the Roman satire. Selections in Latin from the *Satires* and *Epistles* of Horace, and from the *Satires* of Persius and Juvenal. Mr. Boggess
234. HISTORY. I. 3 hr. PR: Latin 109, 110, or equiv. The origin and development of Roman historiography and its Greek antecedents. Selections in Latin from Livy's *History*, from Tacitus' *Agricola*, and from Suetonius' *Julius Caesar*. Mr. Boggess
235. EPIC. I. 3 hr. PR: Latin 109, 110, or equiv. The origin and development of the Greek and Roman epic. Selections from Vergil's *Aeneid*, from Lucretius' *De Rerum Natura*, and from the earlier and later epic poets in Latin. Mr. Boggess
236. PHILOSOPHY. II. 3 hr. PR: Latin 109, 110, or equiv. The origin and development of Greek philosophy and its influence upon Roman philosophy. Selections from Cicero's *Tusculan Disputations* on the immortality of the soul and from Seneca's *Epistles* in Latin. Mr. Boggess
292. PRO-SEMINAR IN LATIN LITERATURE. 1-6 hr. Special topics. Mr. Boggess
301. THESIS. 3-6 hr. Mr. Boggess
392. SEMINAR IN LATIN LITERATURE. 1-6 hr. Special topics. Mr. Boggess

GREEK

292. PRO-SEMINAR IN GREEK LITERATURE. 1-6 hr. Special topics. Mr. Boggess
392. SEMINAR IN GREEK LITERATURE. 1-6 hr. Special topics. Mr. Boggess

LINGUISTICS

211. MIDDLE HIGH GERMAN. I. 3 hr. PR: 12 hr. of German from upper division. Study of the linguistic developments of Middle High German from the eleventh to the fifteenth centuries with illustrative readings from the *Nibelungenlied*. Mr. Stilwell
212. MIDDLE HIGH GERMAN. II. 3 hr. Continuation of Linguistics 211 with illustrative readings from the Middle High German lyric poets and the courtly epics. Mr. Stilwell
225. COMPARATIVE GRAMMAR OF GREEK AND LATIN. I. 3 hr. PR: Consent. Mr. Boggess
226. ITALIC DIALECTS. II. 3 hr. PR: Consent. Mr. Boggess
227. VULGAR LATIN. II. 3 hr. PR: Latin 109, 110, or equiv. Selections from Latin inscriptions and later Latin literature are studied to illustrate the development of the Latin language from its earliest times to its passing into the Romance languages. Mr. Boggess
231. See French 231.
241. See French 241 and Spanish 241.
251. HISTORY OF THE GERMAN LANGUAGE. I. 3 hr. PR: 18 hr. of German or consent. A study of the historical development of standard German with emphasis on its relationships to the other Germanic languages and dialects. Mr. Stilwell
252. COMPARATIVE GERMANIC LINGUISTICS. II. 3 hr. PR: Linguistics 251 or consent. A comparative study of Gothic, Old English, Old Norse, Old High German, and Old Saxon. Mr. Stilwell

271. OLD ENGLISH. I. 3 hr. PR: Consent. Elementary study of Old West Saxon with illustrative materials from prose and poetry. Mr. Stilwell
272. OLD ENGLISH. II. 3 hr. Continuation of Linguistics 271. Comparison of the Old English dialects, with extensive illustrative readings, especially in *Beowulf*. Mr. Stilwell
281. OLD NORSE. I. 3 hr. PR: Consent. Elementary study of Old West Norse prose. Mr. Stilwell
282. OLD NORSE. II. 3 hr. Continuation of Linguistics 281. Readings in various Old Icelandic sagas; introduction to Old Norse poetry. Mr. Stilwell
285. ELEMENTARY SANSKRIT. I. 3 hr. PR: Consent. Mr. Boggess
286. ELEMENTARY SANSKRIT. II. 3 hr. Continuation of Linguistics 285. Mr. Boggess
290. OLD FRENCH. II. 3 hr. PR: Consent. Mr. Manning
292. PRO-SEMINAR IN LINGUISTICS. 1-6 hr. Special topics. Staff
296. OLD SPANISH. II. 3 hr. PR: Consent. Staff
392. SEMINAR IN LINGUISTICS. 1-6 hr. Special topics. Staff

LANGUAGE TEACHING METHODS

221. METHODS AND MATERIALS IN THE TEACHING OF FOREIGN LANGUAGE. I. 2 hr. Required of all prospective elementary and secondary school teachers majoring in foreign language. Staff
222. LANGUAGE LABORATORY TECHNIQUES. II. 2 hr. Required of all candidates for a graduate degree in a foreign language. Staff
242. See *French* 242 and *Spanish* 242.

BIBLIOGRAPHY

265. METHODS OF RESEARCH. I. 3 hr. Mr. Singer

GEOLOGY AND GEOGRAPHY

Before being admitted to candidacy for an advanced degree in Geology, the student must have completed the equivalent of the courses listed in the *Announcements* of the College of Arts and Sciences as curricular requirements for undergraduates majoring in Geology and have a minimum grade-point average of 2.5 (C+). Students who have not had more than a year of physics, a year of chemistry, and mathematics through analytic geometry, will be required to meet these requirements. They therefore will spend more than the minimum time for any advanced degree. Most employment requirements in technical fields, such as petroleum geology, now include not only advanced physics and chemistry but also mathematics through calculus. Employment opportunities are more limited unless this requirement is met. Graduate students are expected to take some supporting courses in such allied fields as mining engineering, geophysics, and biology—depending on their major field of geologic studies.

A grade-point average of at least 3.0 (B) is required for an advanced degree in all courses in geology taken in the department while a graduate student. A student must submit scores in the general aptitude and geology tests of the Graduate Record Examination at the time of registration, or after enrollment take the tests on the first date they are offered on the West Virginia University campus. Each student must make a satisfactory grade in a comprehensive qualifying examination as an additional requirement before being admitted to candidacy for an advanced degree.

A thesis is required of all candidates for advanced degrees in geology. The thesis may be based on field work done while not in residence at the University by arrangement with the candidate's advisory committee. Final examinations (usually oral) on general geologic knowledge and thesis subject must be passed by each candidate for an advanced degree.

Prospective students are urged to write the Chairman of the Department of Geology before making application to the Registrar of the University for admission to the Graduate School.

THE DEGREE OF DOCTOR OF PHILOSOPHY

In addition to the requirements above, the general requirements for the Doctor's Degree are set forth in Part II.

OPPORTUNITIES FOR RESEARCH

The location of the West Virginia Geological and Economic Survey at Morgantown, and the close cooperation between this organization and the Department of Geology, makes a large amount of material available for laboratory investigation. This includes the fossil collections of the Department and the Survey. A large number of samples of drill cuttings from deep wells in West Virginia and adjoining states are housed in the Survey. Morgantown is conveniently situated for detailed studies of Mississippian, Pennsylvanian, and Permian formations. Mineral products of the region near Morgantown include coal, petroleum, natural gas, and limestone. The occurrence and utilization of these materials can be studied by graduate students interested in economic geology. A permanent summer field camp (Camp Wood) is located in the Folded Appalachians at Alvon, Greenbrier County, West Virginia.

201. PHYSICAL GEOLOGY FOR TEACHERS. S. 3 hr. PR: Geol. 1. or equiv., high-school teaching certificate, and consent. Composition and structure of earth and the geologic processes which shape its surface. Staff
202. PHYSICAL GEOLOGY LABORATORY FOR TEACHERS. S. 1 hr. PR: Geol. 1 and/or equiv., high-school teaching certificate, and consent. A laboratory and field study of earth materials and features, and a study of topographic and geologic maps used to represent them. Staff
215. INDUSTRIAL GEOGRAPHY. I. 3 hr. PR: 12 hr. of economics, history, and geology. Factors which contribute to development of major industrial regions; detailed analysis of selected industries. Mr. Little
216. URBAN GEOGRAPHY. II. 2-3 hr. PR: 12 hr. of economics, history, and geology. Study of present-day American cities from their distribution, function and internal structure. Field work in local urban centers and their tributary areas will be made. Mr. Little
219. SEMINAR IN GEOGRAPHY. I, II. 1-3 hr. per sem. PR: 12 hr. of economics, history, and geology. Mr. Little
221. GEOMORPHOLOGY. I. 3 hr. PR: Geol. 151. Study of surface features of eastern United States. Mr. Fridley
222. GEOMORPHOLOGY. II. 3 hr. PR: Geol. 151. Continuation of Geol. 221. Surface features of western United States. Mr. Fridley
228. PHOTOGEOLOGY. II. 3 hr. PR: Geol. 127, 151. Instruction in basic and advanced techniques of air photo interpretation. Mr. Burford
231. INVERTEBRATE PALEONTOLOGY. I, II. 4 hr. PR: Geol. 3, 4. Invertebrate fossils; their biologic classification, evolutionary development, and use in correlation of strata. Mr. Wells
235. INTRODUCTORY PALEOBOTANY. I. 4 hr. PR: Geol. 3 and/or Bot. 2. A resume of the development of principal plant groups through the ages, present distribution, mode of occurrence and index species, methods of collection. Mr. Gillespie
236. ADVANCED PALEOBOTANY. II. 4 hr. Continuation of Geol. 235. Mr. Gillespie
239. SEMINAR IN PALEOBOTANY. I, II. 1-2 hr. per sem., 6 hr. max. PR: Geol. 235. Mr. Gillespie

240. PRINCIPLES OF STRATIGRAPHY. II. 4 hr. PR: Geol. 231. Study of principles of rock and time correlation, emphasis on their application to the stratigraphy of West Virginia. Mr. Donaldson
246. SEDIMENTATION. I. 3 hr. PR: Geol. 185. Origin of sedimentary rocks; principles involved in interpretation of ancient geography, climates, animals, and plants; i.e., basic foundations for stratigraphy. Mr. Donaldson
247. SEDIMENTATION LABORATORY. I. 1 hr. PR: Geol. 185. A laboratory course to accompany or follow the lecture course, Geol. 246, Sedimentation. Mr. Donaldson
263. HYDROLOGY. I. 3 hr. PR: Geol. 151. A study of the principles of ground-water hydrology; the occurrence, development, uses, and conservation of ground-water. The hydrologic cycle emphasized. Mr. Burford
266. FIELD GEOLOGY. SI. 6 hr. PR: Geol. 161, 185, 231. Practical experience in detailed geological field procedures and mapping. Living expenses are in addition to tuition and must be paid on or before registering. Mr. Wells
269. X-RAY DIFFRACTION. I, II. 2 hr. The theory of X-ray diffraction and application to the analysis of crystalline materials using the powder camera and X-ray diffractometer. Open to advanced students in geology, chemistry, engineering and related fields with consent. Mr. Heald
270. GEOLOGY AND MINERAL RESOURCES. S. 3 hr. PR: Open to students in education having Geol. 1 or its equivalent and consent. A general survey of the character, origin, and distribution of land forms and the natural mineral resources, including mineral fuels, nonmetallic minerals, ore deposits, and ground-water with special reference to West Virginia and neighboring Staff
271. ECONOMIC GEOLOGY: ORE DEPOSITS. II. 3 hr. PR: Geol 172, 184. Mineral composition, geologic features, and distribution of deposits of principal useful metallic minerals. Mr. Corbett
272. PETROLEUM GEOLOGY. II. 3 hr. PR: Geol. 151. Origin, geologic distribution, methods of exploration and exploitation, uses and future reserves of petroleum and natural gas in the world, with special attention to the United States. Mr. Burford
273. PETROLEUM GEOLOGY LABORATORY. I, II. 1 hr. PR: Geol. 151. Applications of geologic methods in the search for and development of petroleum resources. Graphic methods in structural and stratigraphic studies, interpretation of lithologic samples and mechanical well logs. Mr. Burford
274. SEMINAR IN ECONOMIC GEOLOGY. I, II. 1-2 hr. per sem. Mr. Corbett
275. COAL GEOLOGY. I. 4 hr. PR: Geol. 4. Study of origin, nature, and distribution of coal deposits. Includes an introduction to microscopic study of coal specimens. Staff
276. ADVANCED COAL GEOLOGY. II. 4 hr. Continuation of Geol. 275. Staff
285. OPTICAL MINERALOGY. I. 4 hr. PR: Geol. 185 and one year of physics. Principles and practice in use of the petrographic microscope in identification of minerals. Emphasis on determinations by immersion method. Mr. Heald
286. PETROLOGY. II. 4 hr. PR: Geol. 285. Composition, texture, occurrence, and origin of rocks. Study of hand specimens and thin sections. Mr. Heald
290. GEOLOGIC PROBLEMS. I or II. 2-3 hr. Specialized work for seniors and graduates. Consult departmental adviser before registration. Staff
291. SEMINAR. I. 1 hr. Mr. Donaldson
292. SEMINAR. II. 1 hr. Mr. Fridley
319. PROBLEMS IN GEOGRAPHY. I, II. 1-4 hr. PR: 12 hr. of social studies and geology. Mr. Little

329. PROBLEMS IN GEOMORPHOLOGY. I, II. PR: Geol. 222. Mr. Fridley
332. MICROPALAEONTOLOGY. II. 4 hr. PR: Geol. 231. Identification of Foraminifera and Ostracoda with aid of microscope. Emphasis upon classification, nomenclature, and use of paleontological literature. Mr. Wells
334. PROBLEMS IN PALEONTOLOGY. I, II. 1-4 hr. PR: Geol. 231. Mr. Wells
339. PROBLEMS IN PALEOBOTANY. I, II. 1-4 hr. PR: Geol. 235. Mr. Gillespie
348. PROBLEMS IN SEDIMENTATION. I, II. 1-4 hr. PR: Geol. 246. Mr. Donaldson
349. PROBLEMS IN STRATIGRAPHY. I, II. 1-4 hr. PR: Geol. 240. Mr. Donaldson
359. PROBLEMS IN STRUCTURAL GEOLOGY. I, II. 1-4 hr. PR: Geol. 151. Mr. Burford
366. PROBLEMS IN FIELD GEOLOGY. I, II. 1-6 hr. PR: Geol. 161. Mr. Donaldson
374. PROBLEMS IN ADVANCED ECONOMIC GEOLOGY. I, II. 1-4 hr. PR: Geol. 271. Mr. Corbett
376. PROBLEMS IN COAL GEOLOGY. I, II. 1-4 hr. PR: Geol. 276. Staff
387. ADVANCED PETROLOGY. I. 3 hr. PR: Geol. 286. A study of the composition, classification, and origin of the igneous and metamorphic rocks. Laboratory work consists of a study of crystalline rocks by microscopical methods. Mr. Heald
388. PROBLEMS IN MINERALOGY AND PETROLOGY. I, II. 1-4 hr. PR: Geol. 286. Mr. Heald
- 397, 398. RESEARCH. I, II. 1-5 hr., 6 hr. maximum. Specialized work for advanced students based upon field or laboratory evidence and reported upon in candidacy for Master's Degree. Staff
399. RESEARCH. I, II. 1-6 hr. per sem., 12 hr. maximum. Open only to Ph.D. candidates. Staff

HISTORY

THE DEGREE OF MASTER OF ARTS

Candidates for the Master's Degree should have had 18 hours of upper-division undergraduate work in history and 9 hours of upper-division undergraduate work in some closely related subject, preferably economics, political science, or sociology. A reading knowledge of one foreign language is desirable.

The Department of History requires that all candidates for the Master of Arts Degree in history present an over-all average of 3.0 (a grade of B) for all graduate courses taken; it will not accept toward an advanced degree credits in courses offered by the Department of History which are reported with a grade lower than "B."

Early in the course the candidate should select a thesis subject, the development of which will require research of at least a semi-independent character. Before the degree is conferred the candidate will be required to pass a satisfactory examination in the field of his thesis and such related fields as may be determined by him in conference with his departmental adviser.

The thesis must be in the hands of the departmental adviser at least thirty days before date of the oral examination, which will be conducted by a committee selected by the adviser and approved by the Dean of the Graduate School. Four hours credit will be allowed for an acceptable thesis. With the approval of the adviser, the candidate for the Master's Degree may substitute course work for the thesis requirement, provided that he shall have satisfactorily completed 36 semester hours of graduate study, which shall include a minimum of 24 hours in History, at least 6 of which shall include courses of the 300 series. Those electing to obtain the Master's Degree by this option will be required to pass a final comprehensive examination (either oral, written, or both) in the fields covered by the course work.

THE DEGREE OF DOCTOR OF PHILOSOPHY

A candidate for the Doctor's Degree must offer a program of study in at least seven fields, five of which must be in history and the others in closely related fields.

The program must be approved by the departmental adviser and the Dean of the Graduate School, but not until the candidate has shown his ability to pursue it by a qualifying examination, given by a committee of the Department, to determine his general knowledge of the entire field of history.

In addition to the qualifying examination, a candidate for the degree shall submit, before the end of the first year of his residence, a piece of research approved by the departmental adviser to satisfy the Department of History of his fitness to proceed with graduate work. After a period of residence, but not until he shall have met the University requirement of ability to read two foreign languages, the candidate will be required to take a comprehensive preliminary examination (oral, written, or both) in six fields, of which four must be in history.

The fields from which selections may be made are: (1) Medieval and Renaissance Europe; (2) History of Europe, 1500-1815; (3) History of Europe, 1789-present; (4) English History, 1066-1714; (5) English History, 1688-present; (6) British Imperial History; (7) Far Eastern History; (8) History of the United States, 1492-1789; (9) History of the United States, 1763-1865; (10) History of the United States, 1850-present; (11) American Diplomatic History; (12) Latin American History; and (13) Local and Regional Problems.

Besides conforming to general regulations (see pages 28-30), doctor's dissertations must show: (1) a thorough mastery of the original sources of information; (2) good literary form or style; and (3) an acceptable standard of documentation, to the end that all important statements of fact may be verified. Upon the satisfactory completion of the dissertation, the candidate is required to take a final oral examination. This examination is designed to bring out the candidate's critical ability and reasoning power and is based on the field covered by the dissertation.

201. MODERN PROBLEMS IN THE ANCIENT AND MEDIEVAL WORLDS. I or II. 3 hr. PR: Staff
At least junior standing.
202. PROBLEMS IN EUROPEAN HISTORY SINCE 1500. I, II. 3 hr. PR: Hist. 1 and 2
or equiv., or consent. Mr. Levine
205. MEDIEVAL CULTURAL HISTORY. I or II. 3 hr. PR: Senior or graduate standing
with one year of European history, or consent. Staff
206. THE RENAISSANCE AND THE REFORMATION. II. 3 hr. PR: For seniors and
graduate students with one year of European history, or with consent. Staff
207. CULTURAL EUROPE, 1600-1800. I or II. 3 hr. PR: For seniors and graduate
students with one year of European history, or with consent. Mr. Easton
208. CULTURAL EUROPE, 19TH CENTURY. I or II. 3 hr. Continuation of Hist. 207.
Mr. Easton
209. FRENCH REVOLUTION. I. 3 hr. PR: Senior or graduate standing with one year
of European history, or consent. Mr. Easton
210. NAPOLEONIC ERA. II. 3 hr. PR: Senior or graduate standing with one year of
European history, or consent. Mr. Easton
220. HISTORY OF CONTEMPORARY RUSSIA. I or II. 3 hr. PR: Same as for Hist. 207.
Mr. Rosenbaum
231. THE BRITISH EMPIRE. I. 3 hr. PR: Hist. 134 or consent. Staff
233. ENGLISH SOCIAL HISTORY, FOURTEENTH TO EIGHTEENTH CENTURY. I, II. 3 hr.
PR: Junior standing. Mr. Levine
234. ENGLISH SOCIAL HISTORY, EIGHTEENTH CENTURY TO PRESENT. I or II. 3 hr.
PR: Junior standing. Mr. Levine
241. EUROPE FROM SEDAN TO VERSAILLES. I. 3 hr. PR: Hist. 1 and 2 or equiv. Staff
242. EUROPE FROM VERSAILLES TO NUREMBERG. II. 3 hr. Continuation of Hist. 241.
Staff
249. THE APPALACHIAN FRONTIER. I or II. 3 hr. PR: Hist. 52 and 53 or equiv.
Mr. Caruso
250. ECONOMIC AND SOCIAL DEVELOPMENT OF WEST VIRGINIA. I or II. 3 hr. PR:
Consent. Primarily for teachers. Mr. Summers

251. THE AMERICAN COLONIAL AND REVOLUTIONARY EXPERIENCES. I or II. 3 hr.
PR: Hist. 52. Miss Krauskopf
252. THE AMERICAN REVOLUTION AND THE CONFEDERATION, 1763-1789. I or II.
3 hr. Miss Krauskopf
254. TRANS-MISSISSIPPI WEST. II. 3 hr. Continuation of Hist. 249. Miss Krauskopf
255. THE JACKSONIAN ERA. II. 3 hr. PR: Hist. 52. Mr. Steel
256. THE OLD SOUTH. I, II. 3 hr. For seniors and graduate students, or with con-
sent. Mr. Steel
257. THE AMERICAN CIVIL WAR. I, II. 3 hr. For seniors and graduate students,
or with consent. Mr. Summers
258. THE CLEVELAND ERA. I or II. 3 hr. For seniors and graduate students, or with
consent. Mr. Summers
259. THE UNITED STATES FROM MCKINLEY TO THE NEW DEAL, 1898-1933. I. 3 hr.
PR: Seniors and graduate students or consent. Mr. Barns
260. AMERICAN DIPLOMACY TO 1901. I. 3 hr. PR: Hist. 52 and 53 or equiv.
Mr. Bagby
261. AMERICAN FOREIGN POLICY AND DIPLOMACY, 1901 TO PRESENT. II. 3 hr. PR:
Hist. 53 or equiv. Mr. Bagby
262. PROBLEMS OF THE PACIFIC. II. 3 hr. PR: Hist. 164. Mr. Ennis
265. AMERICAN CONSTITUTIONAL DEVELOPMENT TO 1860. I. 3 hr. PR: Hist. 52 and
53 or equiv. Staff
266. AMERICAN CONSTITUTIONAL DEVELOPMENT SINCE 1860. II. 3 hr. Continuation
of Hist. 265. Staff
269. RECENT AMERICAN HISTORY. I or II. 3 hr. For seniors and graduate students,
or with consent. Mr. Barns
270. PARTITION OF ASIA. I or II. 3 hr. PR: Hist. 164. Mr. Ennis
271. PROBLEMS IN CONTEMPORARY EUROPE. I or II. 3 hr. Continuation of Hist. 242.
Staff
276. INTRODUCTION TO HISTORICAL RESEARCH AND BIBLIOGRAPHY. I, II. 3 hr. This
course prescribed in fourth year for all history majors. Staff
277. THE LITERATURE OF AMERICAN HISTORY. I or II. 3 hr. Open to graduate
students in history and to seniors majoring in history. Staff
279. AMERICAN ECONOMIC HISTORY TO 1865. I or II. 3 hr. Mr. Barns
280. AMERICAN ECONOMIC HISTORY SINCE 1865. I or II. 3 hr. Mr. Barns
281. THE AMERICAN LABOR MOVEMENT. I or II. 3 hr. PR: Upper division or
graduate standing. Mr. Barns
290. GROWTH OF AMERICAN THOUGHT BEFORE 1865. II. 3 hr. For seniors and
graduate students, or with consent. Mr. Steel
291. GROWTH OF AMERICAN THOUGHT SINCE 1865. II. 3 hr. For seniors and
graduate students, or with consent. Mr. Steel
- 301, 302. THESIS. I, II. 2 or 3 hr. per sem. Staff
- 303, 304. RESEARCH. I, II. 6 hr. per sem. Staff
- 305, 306. DIRECTED TOPICAL READING. I or II. 3-6 hr. Staff
333. SEMINAR IN BRITISH HISTORY: TUDOR PERIOD. I or II. 3 hr. PR: Graduate
standing. Mr. Levine

- 349, 350. PROBLEMS IN LOCAL AND REGIONAL HISTORY. I, II. 3 hr. per sem.
Mr. Barns and Mr. Summers
351. SOCIAL ASPECTS OF THE APPALACHIAN FRONTIER. I or II. 3 hr. Mr. Caruso
356. SEMINAR IN AMERICAN HISTORY, 1492-1789. I, II. 3 hr. Staff
357. SEMINAR IN AMERICAN HISTORY, 1763-1865. I, II. 3 hr. Staff
358. SEMINAR IN AMERICAN HISTORY, 1850-1898. I, II. 3 hr. Staff
359. SEMINAR IN AMERICAN HISTORY, 1890-PRESENT. I, II. 3 hr. Staff
360. RISE OF NATIONALISM IN ASIA. I or II. 3 hr. Mr. Ennis
361. CONTRIBUTIONS OF ASIA TO WESTERN CIVILIZATION. I or II. 3 hr. Mr. Ennis
- 384, 385. PROBLEMS IN BRITISH IMPERIALISM AND WORLD POLITICS. I, II. 3 hr.
per sem. Staff
386. IMPERIAL GERMANY, 1871-1918. I or II. 3 hr. Mr. Easton
387. THE WEIMAR AND BONN REPUBLICS. I or II. 3 hr. Mr. Golay
389. PROBLEMS IN REVOLUTIONARY EUROPE, 1763-1815. I or II. 3 hr. Mr. Easton

LIBRARY SCIENCE

Admission Requirements: Students wishing to do graduate work in Library Science must satisfy the general requirements for admission to the Graduate School as stated on pages 28-30.

The Department of Library Science offers a graduate program which culminates in a Master's Degree. The Master of Education Degree is granted in conjunction with the College of Education and the Graduate School.

The student will be admitted to the graduate program when he has met the following Departmental requirements:

(1) A Bachelor's Degree from an approved college or university with evidence of 12-18 hours of course work in undergraduate Library Science. (Students lacking appropriate undergraduate courses may correct their deficiency by registering for pre-requisite courses offered by the Department.)

(2) A broad cultural background, with a field of specialization.

(3) Evidence of ability to undertake the completion of the Library Science program as well as promise of professional proficiency as shown by previous academic record.

(4) A personal interview whenever possible.

Degree Requirements: The candidate for the Master of Arts in Education Degree with a field in Library Science will be required to complete 30 semester credits of graduate study consisting of:

(1) a. Eighteen graduate credits in Library Science, with an average of B, of which at least 6 credits will be in courses of "300" number; or,

b. Twelve graduate credits in Library Science, with an average of B, of which at least 6 hours will be in courses of "300" number, and 6 graduate credits in a related field (with faculty adviser approval), with an average of B.

(2) Nine graduate credits in Education, with an average of B, to include courses in administration, guidance, audio-visual education, statistics and/or philosophy of education.

(3) A 3-credit problem report in some phase of librarianship; thus completing the 30 semester credits necessary for the degree.

203. LIBRARY MATERIALS FOR CHILDREN. I, S. 3 hr. A survey of the development of children's literature with emphasis on modern books.

205. SELECTION OF BOOKS AND RELATED MATERIALS FOR YOUNG PEOPLE. II, S. 3 hr. A survey of adolescent literature and other library materials adapted to the needs of high school students.

207. SCHOOL LIBRARY ORGANIZATION AND ADMINISTRATION. I, S. 3 hr. A study of the organization and administration of school libraries including planning of rooms, equipment, routines and schedules.
221. PUBLIC AND REGIONAL LIBRARY SERVICE. S. 3 hr. PR: Consent. Principles governing the administration of tax-supported public libraries and the development of larger units of service.
222. FIELD PRACTICE. I, II, S. 3 hr.
223. CATALOGING AND CLASSIFICATION. I, S. 3 hr. Basic principles of cataloging and classification combined with practical experience in processing the various types of books and materials.
224. HISTORY OF BOOKS AND LIBRARIES. II, S. 3 hr.
225. BOOKS AND READING FOR ADULTS. II, S. 3 hr. Reading and evaluation of representative books in broad subject fields.
226. LITERATURE OF THE SOCIAL SCIENCES. II, S. 3 hr. PR: Consent. An approach to the selection and use of books and materials in the social sciences.
227. LITERATURE OF THE HUMANITIES. II, S. 3 hr. Bibliographical and other reference sources in the major subject areas of the humanities, including religion, philosophy, fine arts, music, and literature.
228. LITERATURE OF SCIENCE AND TECHNOLOGY. II, S. 3 hr. PR: Consent. A course designed to give the student a good working knowledge of the increasingly complex literature of science and technology.
230. LIBRARY RESOURCES FOR THE SCHOOL CURRICULUM. I. 3 hr.
235. LIBRARY IN THE ELEMENTARY SCHOOL. II. 2 hr. PR: Lib. Sci. 203.
302. ADMINISTRATION OF COLLEGE AND UNIVERSITY LIBRARIES. I or S. 3 hr.
304. ADVANCED CATALOGING AND CLASSIFICATION. II, S. 3 hr. PR: Lib. Sci. 223.
309. SEMINAR. I or II, S. 2 hr. (Max. credit, 4 hr.). Required of all majors in Library Science.
310. SPECIAL TOPICS. 1-3 hr. PR: Lib. Sci. 309. A thorough study of some phase of library science based on the needs and interest of the individual.
311. PROBLEM REPORT. (Ed. 360). 3 hr. PR: Ed. 301, Lib Sci. 309.

<i>Required courses in Education</i>	5 Hr.
Ed. 301—Research Methods	2
Ed. 360—Problem in Education (Library Science)	3

<i>Electives from this Group</i>	7 Hr.
Ed. 221—Organizing Programs of Audio-Visual Instruction	2
Ed. 231—Philosophy of Education	2
Ed. 271—Educational Statistical Methods	2
Ed. 336—Curriculum	2
Ed. 339—Public-school Organization and Administration	2
Ed. 348—Human Development and Behavior	3
Ed. 373—Basic Course in Principles and Practices of Guidance	3
Ed. 385—History of Education	2

MATHEMATICS

Graduate students in mathematics must pass a qualifying examination before becoming candidates for the Master's Degree. This examination is held in October, February, and June. Its purpose is to check on the student's undergraduate background and test his fitness to pursue graduate work in the Department. A student is not eligible to take his final oral examination the same semester (or summer) he passes his qualifying examination.

The 30 hours required for the Master's Degree will ordinarily include at least 18 hours in the 300 series of mathematics courses. These should consist of courses in each of the three fields of geometry, analysis, and algebra. A student without adequate preparation will find it necessary to take certain prerequisite courses in the 200 series without graduate credit. The minor is usually 6 hours in Physics or some other related field of study. A thesis is optional.

220. NUMERICAL ANALYSIS. II. 3 hr. PR: Math. 108. The composition, propagation and generation of error; matrices and linear equations; nonlinear equations and systems; proper values and vectors of the matrix polynomial; trigonometric and exponential interpolation; numerical integration and differentiation; the Monte Carlo method. Mr. Cochran
232. MATHEMATICAL STATISTICS. II. 3 hr. PR: Math. 108. Discrete and continuous variables; correlation, regression, sampling theory, normal, chi-square, t, and F distributions; significance tests; analysis of variance. Mr. Cochran
235. FOUNDATIONS OF ALGEBRA AND ANALYSIS. II. 3 hr. PR: Math. 108 or consent. Development of the natural numbers, integers, rational, real and complex numbers from the axioms of Peano; cardinal and ordinal arithmetic; the equivalence of the axiom of choice; Zorn's Lemma and the well ordering theorem; the algebra of classes. Mr. Cunningham
238. MODERN GEOMETRY FOR TEACHERS. S. 3 hr. PR: Math. 108 or consent. For high school teachers. Extension of traditional Euclidean plane geometry. Geometry of points, lines, triangles, and circles; similarity, inversion, and polars. Mr. Cochran
240. DIFFERENTIAL EQUATIONS. I, II. 3 hr. PR: Math. 108. First course. Types of ordinary differential equations of first or higher degree and of first or higher order. Solutions and applications. Not open to students with credit for Math. 253. Staff
242. ADVANCED REAL CALCULUS. I. 3 hr. PR: Math. 108. This is a preparatory course for Math. 256. Fundamental principles of limits, derivatives, integrals and series. Mr. Vest
243. PROJECTIVE GEOMETRY. II. 3 hr. PR: Math. 246. Projective, affine, and metric geometries of the line, plane, and space; conics and quadrics. Mr. Davis
244. THEORY OF EQUATIONS. S. 3 hr. PR: Math. 108. Complex numbers, division, factorization and other properties of polynomials in a field. Theory of equations in the field of rational numbers; in the field of real numbers. Elimination, resultants, and symmetric functions. Algebraic extensions of a field. Algebraically closed fields. Ruler and compass construction. Mrs. Easton
245. VECTOR ANALYSIS. I. 3 hr. PR: Math. 240 or 253. Vector definitions and operations, differentiation, operator ∇ , integration, generalized coordinates, irrotational and solenoidal vectors, electrostatic fields, potentials. Staff
246. INTRODUCTION TO ALGEBRAIC THEORIES. II. 3 hr. PR: Math. 108 or consent. Polynomials, elementary transformations on rectangular matrices, equivalence of forms and matrices, linear spaces, and matrix polynomials; groups, rings and fields. Mr. Peters
247. THEORY OF NUMBERS. S. 3 hr. PR: Math. 108. Divisibility, distribution of primes theory of congruences, theory of quadratic residues, arithmetical properties of the roots of unity. Diophantine equations, and the prime number theorem. Mr. Gould
248. HISTORY OF MATHEMATICS. S. 3 hr. PR: Math. 5. Ancient Near East arithmetic, Euclid's geometry. Algebras of Babylonians, of Cardano and Tartaglia, non-Euclidean geometry. Descartes's work, conditions of Newton and Leibnitz. Mrs. Easton
251. ADVANCED CALCULUS. I. 3 hr. PR: Math. 108. Partial differentiation; Euler's theorem; Taylor's series; Jacobians; maxima and minima; Lagrange's multipliers; multiple integrals; line and surface integrals. Staff

252. ADVANCED CALCULUS. II. 3 hr. PR: Math. 251. Continuation of Math. 251. Limits and indeterminate forms; infinite series; improper integrals; applications of uniform convergence; Gamma and Beta functions; Stirling's formula; Fourier series. Staff
253. ADVANCED COURSE IN APPLIED MATHEMATICS. I. 3 hr. PR: Math. 108. Ordinary differential equations with emphasis on linear equations; infinite series. Fourier series, solutions of ordinary differential equations by infinite series. Applications to engineering problems. Not open to students with credit for Math. 240. Staff
254. ADVANCED COURSE IN APPLIED MATHEMATICS. II. 3 hr. PR: Math. 253. Finite differences, partial differential equations, Bessel functions and Legendre polynomials. Vector analysis. Mr. Vest
256. INTRODUCTION TO COMPLEX VARIABLES. II. 3 hr. PR: Math. 242 or 252. An introductory course intended for students in engineering and physics. Elementary principles, conformal mapping, and applications. Mr. Vest
259. INTRODUCTION TO THE LAPLACE TRANSFORM. II. 3 hr. PR: Math. 240 or 253. An introduction at the undergraduate level to the theory and applications of the Laplace transform. The treatment is restricted to real variables to permit early introduction of the course into the student's curriculum. Mr. Vest
- 261, 262. SPECIAL TOPICS. S. 2-4 hr. PR: Math. 108 or consent. Primarily for teachers. Useful topics not covered in the regular required course. Content may vary with the needs of the student. Staff
263. SPECIAL TOPICS. II. 2-3 hr. PR: Math. 262 or consent. Sets; relations; axiomatization of a mathematical system; structure of Real Number System; algebraic expressions; and critical study of the foundations of Euclidean geometry. Mr. Peters
- 264, 265. FOUNDATIONS OF ALGEBRA. S. 2 hr. PR: Differential and integral calculus. Not open to students with credit for Math. 246. Mr. Vest
- 266, 267. FOUNDATIONS OF GEOMETRY. S. 2 hr. PR: Differential and integral calculus. Mr. Cunningham and Staff
- 268, 269. PROBABILITY AND STATISTICS. S. 2 hr. PR: Differential and integral calculus. Staff
308. THEORY OF PROBABILITY. I. 3 hr. PR: Math. 108. Fundamental theorems. Development of density and distribution functions in the discrete and continuous cases. Classical problems and solutions. Moments, characteristic functions, limit theorems. Applications. Mr. Stewart
309. GROUP THEORY. II. 3 hr. PR: Math 246 or consent. Order, index, coset, normal subgroup, factor group, homomorphism; direct product; fundamental theorem of Abelian groups; and Jordan-Holder theorem. Mr. Peters
311. POINT-SET TOPOLOGY. I. 3 hr. PR: Math. 252. Transfinite cardinal numbers, well-ordered sets, transfinite ordinal numbers, closed and perfect sets, measurable point sets in Borel sense; applications to Riemann and Lebesgue integrals. Staff
312. INTRODUCTION TO COMBINATORIAL TOPOLOGY. II. 3 hr. PR: Math. 252. Linear graphs, two-dimensional complexes and manifolds, n-dimensional complexes and manifolds, orientable manifolds. The fundamental group and certain unsolved problems. Staff
313. ADVANCED DIFFERENTIAL EQUATIONS. II. 3 hr. PR: Math. 240, 252. Second-order linear equations, Riccati equations, complex variables. Series solutions. Equations of Fuchsian type, hypergeometric equation, confluence of singularities. Classical equations, applications. Mr. Vest
314. TENSOR ANALYSIS. II. 3 hr. PR: Math. 245, 252. Vector concept developed from standpoint of algebraic invariants, surface geometry, tensor operators.

curvature tensor. Ricci and Bianchi identities, applications of tensors to physical phenomena. Mr. Stewart

315. CALCULUS OF VARIATIONS. II. 3 hr. PR: Math. 240, 252. Maximum and minimum value of an integral, shortest distance, the brachistochrone problem, surfaces of revolution of minimum area, conditions for a relative minimum. Applications. Mr. Vest
- 320, 321. SPECIAL FUNCTIONS. I, II. 3 hr. PR: Math. 240, 252. Operational techniques; generalized hypergeometric functions; classical polynomials of Bell, Hermite, Legendre, Noerlund, etc. Introduction to recent polynomial systems. Current research topics. Mr. Gould
- 331, 332. THEORY OF PARTIAL DIFFERENTIAL EQUATIONS. I, II. 6 hr. PR: Math. 240, 252, or equiv. Elementary concepts; Cauchy problems; the Cauchy-Kowalewski theorem; general existence theorems; associated surfaces; classification into elliptic, parabolic, and hyperbolic types; conditions required of coefficients for solvability; techniques for solution; distribution theory; and numerical methods. Mr. Vest
- 351, 352. ALGEBRAIC GEOMETRY. I, II. 3 hr. per sem. PR: Math. 243, 246. Characteristic properties and representations of curves and surfaces, algebraic correspondences; linear systems; enumerative geometry. Mr. Cunningham
353. LINEAR ALGEBRA. II. 3 hr. PR: Math. 246 or consent. Review of theory of groups and fields; linear vector spaces including the theory of duality; full linear group; bilinear and quadratic forms; and theory of isotropic and totally isotropic spaces. Mr. Peters
357. FOURIER SERIES AND PARTIAL DIFFERENTIAL EQUATIONS. I. 3 hr. PR: Math. 240 (or 253), 252. Introductory material, partial differential equations of physics, orthogonal sets; solving boundary value problems by Fourier series and integrals, uniqueness of solutions; Bessel functions, Legendre polynomials. Mr. Vest
358. OPERATIONAL METHODS IN PARTIAL DIFFERENTIAL EQUATIONS. II. 3 hr. PR: Math. 240 (or 253), 252. Laplace transformation, properties and elementary applications; problems in partial differential equations, complex variable; problems in heat condition, mechanical vibrations, etc. Sturm-Liouville systems. Fourier transforms. Mr. Vest
- 360, 361. DIFFERENTIAL GEOMETRY AND THEORY OF SURFACES. I, II. 3 hr. per sem. PR: Math. 240, 243. Metric properties of space curves and surfaces by differential methods. Parametric representation, curvature, torsion, trihedrons, geodesics, transformations, conformability, developability, ruled surfaces. Mr. Davis
- 362, 363. INTRODUCTION TO MODERN ALGEBRA. I, II. 3 hr. per sem. PR: Math. 246 or consent. Review of concepts from set theory and the system of natural numbers, semi-groups; rings, integral domains and fields; extensions of rings and fields; elementary, factorization theory; groups with operators; modules and ideals; and lattices. Mr. Peters
- 364, 365. THEORY OF FUNCTIONS OF COMPLEX VARIABLES. I, II. 3 hr. per sem. PR: Math. 240, 252. Complex numbers; functions of a complex variable; fundamental theorems of Cauchy; conformal representation with applications; analytic continuation; calculus of residues; Gamma, Bessel, and elliptic functions. Mr. Vehse
- 366, 367. HIGHER PLANE CURVES. I, II. 3 hr. per sem. PR: Math. 241, 243. Algebraic plane curves. General theory of curves, singularities, relationships, associated curves; detailed study of curves of third and fourth order. Staff
- 372, 373. LINE COMPLEXES AND CREMONA TRANSFORMATIONS. I, II. 3 hr. per sem. PR: Math. 243. Line coordinates, null system, systems of complexes, congruences, surface theory, and mapping. Plane Cremona transformations, introduction to general space theory, opportunities for research. Mr. Davis

- 374, 375. ALGEBRAIC SURFACES. I, II. 3 hr. per sem. PR: Math. 243. Mapping of quadratic, cubic, quartic, and quintic surfaces, on the plane; space transformations, equivalence, postulation; curves on a surface, adjoint systems, invariants. Mr. Davis
- 376, 377. THEORY OF FUNCTIONS OF A REAL VARIABLE. I, II. 3 hr. per sem. PR: Math. 235, 246, and 252. Review of elementary point set concepts. Necessary and sufficient conditions under which operations of previous analytical subjects are valid. Different theories of integration. Mr. Cunningham
380. THESIS. I, II. 3 hr. Staff

ASTRONOMY

216. ASTRONOMY FOR TEACHERS. S. 3 hr. Introduction to astronomy with special emphasis on the needs of physical science teachers and science club directors. Not open to students with credit for Math. 106. Mr. Cochran
255. MATHEMATICAL ASTRONOMY. II. 3 hr. PR: Math. 106, 240. Development of the implications of Kepler's Laws and Newton's Law of Gravitation. Mr. Cochran

PHILOSOPHY AND PSYCHOLOGY

PHILOSOPHY

Philosophy has two main functions: (1) critical analysis of basic concepts, ideas, ideals, and beliefs; (2) organization of knowledge, and the development of patterns of tested belief for guidance of individual and institutional conduct.

Courses in philosophy are especially useful: (1) as a valuable background for policy-making positions in government, business, schools, and church; (2) as a preparation for work in the field of religion; (3) as an indispensable foundation for graduate training leading to teaching and research in philosophy; (4) as a general education providing conditions for the organization of knowledge and a clearer recognition of values.

The Master's Degree is not at present offered in Philosophy. For those who are candidates for the degree in other fields and who desire a minor in Philosophy, the following courses are offered. A reading knowledge of French, German, or both is recommended.

205. ORIENTAL RELIGIONS AND PHILOSOPHIES. I. 3 hr. PR: Two courses in philosophy, or consent. An account of the religions of India, China, and Islam with their supporting philosophies; and the influence of the major Oriental world views on the Western World. Mr. Cresswell
208. PHILOSOPHY OF RELIGION. I or II. 3 hr. PR: Philos. 4 or 104 or consent. An attempt to discover the logically defensible foundations of religion. Mr. Cresswell
210. PHILOSOPHY OF SCIENCE. II. 3 hr. PR: Philos. 4 or 104. An examination of the methods, presuppositions and concepts of modern science. For students interested in the influence of science on contemporary thought and society. Mr. Cresswell
217. METAPHYSICS. I or II. 3 hr. PR: Philos. 4 or 104, 112 or 113. Study of a selected system of philosophy. Staff
221. AXIOLOGY. II. 3 hr. PR: Philos. 4 to 104 and 107 or consent. Study of the origin, nature, and growth of value as the basis of intelligent development of normative disciplines including the applied sciences, law, art, and religion. Mr. Minor

PSYCHOLOGY

Admission. Acceptance of the student will be based on: (1) adequate academic aptitude at the graduate level as measured by the Miller Analogies Test or Graduate Record Examination; (2) a minimum average grade of 2.5 (C+) over the last two undergraduate years; (3) personal qualities in the applicant which are predictive of success in graduate study and satisfactory professional placement after

graduation; (4) adequate preparation in the biological and social sciences, experimental psychology, and statistics. By permission, deficiencies in preparation may be made up after admission to the department. Students are expected to maintain a 3.0 (B) average in their psychology courses during the first graduate year, and to present a final 3.0 average in all psychology courses attempted.

The M.A. Degree. The graduate program leading to the master's degree prepares the student for doctoral study or for technical employment at the M.A. level. Competence in the basic "core" areas of psychology is stressed; however the student may specialize to a limited extent in the technology of clinical or industrial psychology. Facilities include a child guidance clinic where students may gain practical experience in the clinic team approach to behavior problems. Comprehensive written examinations in several basic areas of psychology must be taken within two years after admission to the department. A thesis reporting the results of experimental research must be presented. The final oral examination will cover the thesis and related areas.

The Ph.D. Degree. The doctoral programs aim to prepare a small number of well-qualified psychologists for two types of careers: (1) the teaching of general psychology and (2) clinical service in institutions, clinics, or schools. Both programs require at least 75 semester hours of work exclusive of dissertation or internship. The clinical program requires a 12-months internship in an approved setting. The career teacher program requires an academic year of supervised college teaching.

Students are admitted to doctoral study only after completion of the master's degree or its equivalent and may be subject to a screening examination to determine their readiness for doctoral work. After about 30 hours of work in residence beyond the M.A. degree the student will be admitted to a comprehensive preliminary examination in which he must demonstrate a reading knowledge of French and German, competence in research design and applied statistics, and a knowledge of such core areas of psychology as may be required of all students.

Upon successfully passing the qualifying examination, the student will be formally promoted to candidacy for the doctorate. He will then be assigned a doctoral committee which will direct his further course work and his dissertation research, and will approve his internship setting.

After completion of a satisfactory dissertation and all other requirements, the candidate will take a final examination, written, or oral, over his major and minor specialties and the dissertation.

201. **PHYSIOLOGICAL PSYCHOLOGY. I or II.** 3 hr. PR: Psych. 103, 104 and Zool. 171 or equiv. The organic basis for psychological activities such as perception, emotion, motivation, and learning. Mr. Shafer
205. **INDIVIDUAL DIFFERENCES. II.** 2 hr. PR: One course in psychology. Nature and extent of the differences among individuals in psychological traits such as intelligence and personality, as influenced by heredity, schooling, age, sex, culture. Primarily for students in psychology and education. Mr. Cross
206. **LEARNING AND MOTIVATION. I or II.** 3 hr. PR: Psych. 103, 104 or equiv. Survey of experimental data in the area of learning and motivation. Special emphasis on contemporary learning theory. Mr. Shafer
214. **JOB ANALYSIS. I or II.** 3 hr. PR: Psych. 244 or I.E. 140. Instruction and supervised practice in preparation and use of job analyses. For students of psychology, engineering, management, or rehabilitation counseling. Mr. Cross
216. **ATTITUDES AND PROPAGANDA. I.** 3 hr. PR: Psych. 1 or 3 and 4, or consent. Includes: the nature of attitudes and opinions, attitude measurement, opinion changing, propaganda use and analysis, the social psychology of mass media, democratic values and public opinion. Designed to meet the needs of students from a variety of fields as well as psychology—especially sociology, political science and journalism. Mr. Rankin
218. **PSYCHOLOGY OF PERSONALITY. I or II.** 3 hr. PR: Two courses in psychology or consent. Critical consideration of major theories of personality, including Freudian, neo-Freudian, learning theory, and trait theory. The basis and logic of personality theorizing will also be stressed. Mr. Rankin

225. GROUP PSYCHOMETRIC TESTING. I. 3 hr. PR: Psych. 1, or 3 and 4, and 130. Theory underlying the construction of group tests of intelligence, aptitudes, interests, personality, and attitudes. Practice in administering, scoring, and interpreting them. Mr. Cross
226. ADVANCED EXPERIMENTAL PSYCHOLOGY. II. 3 hr. PR: Psych. 103, 104, 130. Lectures and laboratory. Design of psychological experiments; psychophysics of audition and vision. Mr. Shafer
229. ABNORMAL PSYCHOLOGY. II. 3 hr. PR: Psych. 1, or 3 and 4. A consideration of the major behavior anomalies, e.g., schizophrenia, psychopathic personality, organic psychoses, etc., and the various psychological, chemical, surgical, and medical treatments thereof. Mr. Ferguson
233. PROBLEM CHILDREN. II. 3 hr. PR: Child or educational psychology. Study of children who present psychological problems because of: (1) exceptional mental retardation or advancement; (2) organic disabilities having behavior consequences, such as cerebral palsy or deafness; (3) disorders of conduct associated with atypical personality functioning. Of special interest to those who regularly deal with children as teachers, nurses, etc. Mr. Carruth
236. PSYCHOLOGY OF ADJUSTMENT. I. 3 hr. PR: Psych. 1, or 3 and 4, or consent. Dynamic principles of human personality adjustment. Mr. Durth
238. INTRODUCTION TO CLINICAL PSYCHOLOGY. I or II. 2 hr. PR: Psych. 218, 236, or consent. The contribution of clinical psychology to understanding people. Foundation for advanced courses in clinical methods and skills. Of interest to advanced undergraduates and graduates in education, guidance, personnel, and social work as well as professionally oriented students in psychology. Mr. Dana
240. HISTORY OF PSYCHOLOGY. II. 3 hr. PR: Psych. 1, or 3 and 4. Traces the development of the science and concepts of psychology from their origin in philosophy, physiology and medicine up to the modern era. Mr. Curtis
242. ADVANCED SOCIAL PSYCHOLOGY. I. 3 hr. PR: Psych. 116 or consent. A consideration of contemporary theory and practice in social psychology. Mr. Rankin
244. PERSONNEL PSYCHOLOGY. I, II. 3 hr. PR: Psych. 1 or 3, 4, and a course in applied statistics. Application of psychological principles and techniques for selecting personnel, evaluating performance, analyzing jobs and workers. Mr. Decker
- 245, 246. SEMINAR. I, II. 1 or 2 hr. Critical study of selected topics. Staff
260. STATISTICAL METHODS IN PSYCHOLOGY. I. 3 hr. PR: Psych. 130 or equiv. Sampling theory, probability, further parametric and non-parametric statistics. Mr. Thomas
270. GROUP DYNAMICS. (Same as Sociology 270). I or II. 3 hr. PR: Introductory course in psychology or sociology, or permission. An interdepartmental course, combining psychological and sociological approaches, in which the dynamics of groups in operation are considered. The following subjects will be treated: leadership, informal communication and group pressures, the relation of group aims to group organization, and the effect of the group on personality. Attention is given to recent researches and to practical applications. Mr. Rankin and Mr. Silberstein
- 301, 302. SPECIAL PROBLEMS IN RESEARCH. I, II. 1-3 hr. per sem. Staff
- 303, 304. THESIS. I, II. 2-3 hr. per sem. Staff
- 305, 306. DIRECTED STUDY. I, II. 1-3 hr. Directed reading and research in special areas. Staff
310. PROJECTIVE TECHNIQUES. I or II. 3 hr. PR: Psych. 324, and consent. Survey of the projective techniques used in psychodiagnostics, including the Thematic Apperception Test and the Rorschach Test. Special emphasis will be given the Rorschach Test. Mr. Dana

311. PRACTICUM IN PROJECTIVE TECHNIQUES. I or II. 1-3 hr. PR: Psych. 310 or equiv. Supervised practice in scoring and interpretation of the Rorschach Test and the Thematic Appreciation Test. Mr. Dana
314. PRACTICUM IN INDUSTRIAL INTERVIEWING. I. 3 hr. PR: Psych. 115 or 244. Includes a survey of literature concerned with industrial interviewing, a review of personal history data found to be significant in industrial selection, and intensive study of interview techniques, practice and recorded interviews by the student with critiques by the instructor. Mr. Decker
316. COUNSELING AND PSYCHOTHERAPY. I or II. 3 hr. PR: Psych 218, 229 and consent. Principles underlying individual and group psychotherapy. Mr. Ferguson
317. PRACTICUM IN COUNSELING AND PSYCHOTHERAPY. I or II. 1-3 hr. PR: Psych. 316 or equiv. Supervised experience in psychotherapeutic techniques used by the psychologist in a clinic setting. Mr. Ferguson
324. INDIVIDUAL INTELLIGENCE TESTING. II. 4 hr. PR: Psych. 122 and 225, or Educ. 106 and 375, and consent. Theory and practice in Binet, Wechsler, and other individual tests of mental status. Mr. Ferguson
329. BEHAVIOR PATHOLOGY. II. 3 hr. PR: Psych. 218, 229, or consent. The etiology and dynamics of severe behavior pathology. Mr. Carruth
330. SYSTEMS OF PSYCHOLOGY. II. 3 hr. PR: Psych. 1, or 3 and 4, and one course in philosophy. Staff
331. THEORY CONSTRUCTION. II. 3 hr. Problems and techniques of organizing the data of psychology; philosophical background, problems of definition, logical structures and techniques employed. Staff
- 338, 339. CLINICAL PSYCHOLOGY. I, II. 1-3 hr. PR: Psych. 324 and consent. Supervised practice in use of psychological techniques in a clinic setting. Mental testing, interviewing parents, personality diagnosis, test interpretation and reports, play techniques with children, case presentations at staff meetings. Emphasis is on the multi-discipline approach at the University Counseling Center. Staff
- 345, 346, 347, 348. SEMINAR. I, II. 1 or 2 hr. Critical study of selected topics. Staff
- 350, 351. PRACTICUM IN STUDENT-PERSONNEL PSYCHOLOGY. I, II. 1-3 hr. PR: Psych. 236 or consent. Diagnostic and remedial techniques for dealing with reading and work-study-skills efficiency, and personal-social-emotional adjustment. Mr. Cross
352. PRACTICUM IN VOCATIONAL APPRAISAL. I, II. 1-3 hr. PR: Consent. Principles and procedures in appraising educational and vocational fitness. Supervised practice in testing and counseling college students presenting educational and vocational problems. Mr. Cross
360. ANALYSIS OF VARIANCE. I. 3 hr. PR: Psych. 130, 260, or consent. A discussion of tests of homogeneity of variance, parametric and nonparametric analysis of variance, and analysis of covariance. Implications of these techniques for experimental design will be considered. Mr. Thomas
361. CORRELATIONAL ANALYSIS. I or II. 2 hr. PR: Psych. 130. A study of the correlational techniques used in research and development in psychology with practice in the application of the methods to typical problems. The methods studied will include product-moment, biserial, tetrachoric, partial and multiple, and others. Mr. Decker

PHYSICS

A candidate for the degree of Master of Science in Physics should have had introductory work in mechanics, electricity, and modern physics as acquired in undergraduate courses in physics or in related sciences at an approved college or

university. Physics Seminar and research leading to a thesis are required. The remaining credit to make a total minimum of 30 semester hours are chosen from the graduate courses in physics, mathematics, and other suitable sciences as approved by his adviser.

Applicants for the degree of Doctor of Philosophy will be required to pass a preliminary qualifying examination after one year of graduate work, to demonstrate reading proficiency in two languages (French, German, or Russian), to complete a minimum of 60 hours of graduate credit, to gain approval of his dissertation, and to pass a final oral examination.

- 201, 202. SPECIAL TOPICS. I, II. 1-3 hr. per sem. Staff
213. INTRODUCTORY ELECTRONICS. S. 3 hr. PR: 1 year college physics. Primarily for Education majors; not for graduate credit for science majors. Mr. Errington
221. OPTICS. II. 3 hr. PR: 19 hours of college physics, calculus. Work with optical instruments, spectrometry, interferometry, and polarization. Mr. Vehse
- 225, 226. INTRODUCTION TO MODERN PHYSICS. I, II. 3 hr. per sem. PR: 10 hr. of college physics, calculus. Particle analysis, phenomena connected with the structure of the atom. Mr. Ford
- 231, 232. THEORETICAL MECHANICS. I, II. 3 hr. per sem. PR: 10 hr. college physics, calculus. Theorems and problems in intermediate mechanics. Mr. Williamson
- 233, 234. INTRODUCTORY ELECTRICITY AND MAGNETISM. I, II. 3 hr. per sem. PR: 10 hr. physics and calculus. Electrostatic, magnetostatics, network analysis, introduction of electrodynamics, and applications. Mr. Jefimenko
- 241, 242. MECHANICS LABORATORY. I, II. 1 hr. per sem. To accompany Physics 231, 232. Mr. Ford
- 243, 244. ELECTRICITY LABORATORY. I, II. 1 hr. per sem. To accompany Physics 233, 234. Mr. Jefimenko
- 245, 246. MODERN PHYSICS LABORATORY. I, II. 1 hr. per sem. To accompany Physics 225, 226. Mr. Ford
- 247, 248. PHYSICS SEMINAR. I, II. No credit. Required of Junior, Senior and Graduate physics majors. Staff
254. OUTLINE OF MODERN PHYSICS. S. 3 hr. PR. 10 hr. college physics, 1 year college math. Selected topics in modern physics. Primarily for Education majors; not open to physics majors. Mr. Ford
- 255, 256. WORKSHOP FOR PHYSICS TEACHERS. SI, SII. 2 hr. PR: 1 year of college physics, 1 year of college mathematics. Techniques of apparatus construction and demonstration. Primarily for Education majors; not open to physics majors. Mr. Williamson
257. PHOTOGRAPHY. SI. 3 hr. PR: 1 year of physics or equiv. Primarily for Education majors; not open to physics majors. Mr. Farr
258. LIGHT. SII. 3 hr. PR: 1 year of physics or equiv. Primarily for Education majors; not open to physics majors. Mr. Ford
- 271, 272. SOLID STATE PHYSICS. I, II. 3 hr. per sem. PR: Physics 225, 226. Theoretical concepts required for the understanding of the physical properties of simple crystalline solids. Mr. Pavlovic
283. THERMODYNAMICS. I. 3 hr. PR: 10 hr. of college physics and calculus. Application of First and Second Laws of Thermodynamics to physical systems. Mr. Vehse
284. KINETIC THEORY. II. 3 hr. PR: 10 hr. of college physics and calculus. Boltzmann distribution, viscosity, diffusion, thermal conductivity, specific heat. Mr. Pavlovic

- 287, 288. INTRODUCTION TO MATHEMATICAL PHYSICS. I, II. 3 hr. per sem. PR: 10 hr. of college physics and calculus. Boundary value problems in vibration, heat conduction, hydrodynamics, special relativity. Mr. Thomas
- 321, 322. PHYSICAL OPTICS. I, II. 3 hr. per sem. PR: Physics 221, differential equations. Mr. Ford
- 331, 332. ADVANCED CLASSICAL MECHANICS. I, II. 3 hr. per sem. PR: Physics 231, 232. Lagrangian, and Hamiltonian formulations of mechanics, Hamilton-Jacobi theory, small oscillations. Mr. Rexroad
- 333, 334. ADVANCED ELECTRICITY AND MAGNETISM. I, II. 3 hr. per sem. PR: Physics 233, 234, differential equations. Potential, energy, and forces in electro-magnetic fields; waves and radiation; electrodynamics of moving systems, charged particles. Mr. Jefimenko
- 341, 342. RESEARCH SEMINAR. I, II. 3 hr. per sem. PR: Consent. Theory and techniques in specialized areas of research problems. Staff
- 351, 352. QUANTUM MECHANICS. I, II. 3 hr. per sem. PR: Physics 225, 226. Schrodinger's equation, hydrogen atom, perturbation, molecular forces. Mr. Rexroad
353. ADVANCED QUANTUM MECHANICS. I. 3 hr. PR: Physics 351, 352. The relativistic theory of the electron, introduction to quantum electrodynamics. Mr. Rexroad
- 363, 364. NUCLEAR PHYSICS. I, II. 3 hr. per sem. PR: Physics 225, 226. Theory of nuclear forces, transformations, energy level. Mr. Thomas
383. STATISTICAL MECHANICS. II. 3 hr. PR: Physics 238, 352. Theory and applications of classical and quantum statistics. Mr. Hotz
- 397, 398. RESEARCH. I, II. 1-6 hr. per sem. PR: Consent. Staff

POLITICAL SCIENCE

The graduate program in political science at West Virginia University extends through the Doctor of Philosophy degree. With reference to departmental objectives, the emphasis is placed upon more extensive and intensive training than is possible on the undergraduate level. This involves: (1) the development of a broader knowledge of the literature of political science; (2) some degree of specialization in one of the major areas of the disciplines; and (3) training in the identification and analysis of problems in governmental theory and practice. Graduate work in political science contributes to a general education and provides the foundation for more advanced work in the field. Leading professional possibilities for political science majors include teaching, the public service, and preparation for the legal profession.

THE DEGREE OF MASTER OF ARTS

Eligibility. Regular applicants for the Master of Arts degree should present a minimum of 12 semester hours of undergraduate credit in political science and at least 6 additional hours in some cognate field, including history, economics, sociology, psychology, philosophy, or social work. Students who do not meet the minimum requirements may, after consultation with the adviser, be admitted conditionally. In addition, a grade-point average of 2.5 should have been maintained as an undergraduate.

"Special" graduate students who are not working for an advanced degree may be admitted to courses for which they can satisfy the prerequisites.

Course Requirements. Admission to candidacy for the Master of Arts degree in political science is conditioned upon the completion of at least 30 hours of graduate work including a thesis. The candidate should present 18 semester hours of graduate course work in political science and 6 hours of similar work in a cognate field, such as economics, history, sociology, philosophy, psychology, social work or education. Exceptions to this general rule may be made by the departmental adviser in the case of students with an inadequate background in political science who

transfer from other institutions or from other departments in West Virginia University. Normally the thesis will carry 6 hours credit. A reading knowledge of a foreign language is highly desirable.

Thesis and Final Examinations. In his graduate program, the student will write a thesis on a subject falling within his field of specialization. Fulfillment of the thesis requirement includes the following steps: (1) selection of a problem or topic for research in the problem area; (2) extensive reading and collection of data in the problem area; (3) organization, analysis, and evaluation of the data; (4) writing the thesis in correct form; (5) acceptance of the completed thesis by a committee composed of at least three faculty members, one of whom shall not be a member of the Department of Political Science, and (6) passing an oral or written examination or both, administered by the committee on the thesis and the major and minor fields.

Research on the thesis project will be done under the supervision of a staff member in whose field of specialization the thesis problem falls.

Students who fail to pass the final examination may appear for a second examination not earlier than the semester following that in which the first examination was given. It is contrary to departmental policy to give a third examination.

THE DEGREE OF DOCTOR OF PHILOSOPHY

To gain admission to the program leading to the Doctor of Philosophy degree applicants must have completed the requirements for a master's degree, or the equivalent, at an approved institution as well as have demonstrated a capacity for graduate work in the Graduate Record Examination.

The program of courses will depend upon the individual needs of the student and the extent of his previous training in Political Science and related fields. Work leading to the doctoral degree consists of a minimum of three full years of graduate study—60 semester hours after the bachelor's degree, in addition to research for the dissertation. Credits completed for a master's degree may be included in the doctoral program, with the exception of research credit granted for the master's thesis. A minimum of 36 hours or its equivalent in residence in full-time graduate study at West Virginia University is required.

With the approval of his adviser, a prospective candidate selects: (A) four major areas in the field of Political Science from the following six offered by the Department: (1) American National, State and Local Government; (2) Politics and Policy Development; (3) Public Administration; (4) Foreign and Comparative Government; (5) International Relations, Organizations, and Law; and (6) Political Theory; and (B) a minor area in a related field. At least one year prior to the conferring of the degree and after maintaining at least a 3.0 average in the major field and a 2.0 average in the minor, a prospective candidate is formally admitted to candidacy for the Doctor's degree upon satisfactorily passing written and oral examinations in the four major areas and the minor. To be eligible for these examinations, the prospective candidate must have demonstrated competency in two languages other than English (normally French and German) through examinations conducted by the appropriate language departments.

Upon admission to candidacy for the Doctor of Philosophy degree, the candidate must select a topic for a dissertation under the direction of his adviser, complete a dissertation which makes a contribution to knowledge in the candidate's area of concentration, and pass a final examination based primarily upon the dissertation. After successful completion of this final examination, the candidate will be recommended for the degree.

200. RESEARCH MATERIALS AND TECHNIQUES IN POLITICAL SCIENCE. I. 3 hr. A study of basic source materials in political science and of the techniques and methods of governmental research. Required of graduate majors.

210. AMERICAN POLITICAL INSTITUTIONS. I. 3 hr. PR; Pol. Sci. 2 or consent. Development of the Constitution, Congress, the Presidency, and the Supreme Court as institutions with special attention to current problems and issues.

211. PROBLEMS OF AMERICAN NATIONAL GOVERNMENT. II. 3 hr. This course is intended to give recognition to the major contemporary problems of government. Extensive reading of background materials as well as current literature in the field.

Mr. Drake and Mr. Stewart

213. AMERICAN CONSTITUTIONAL LAW AND THEORY. II. 3 hr. PR: Pol. Sci. 2 or consent. Basic principles of American constitutional law as developed through interpretation with special emphasis on constitutional theories and national development. Primarily for seniors and graduate students. Mr. Gilkey
218. GOVERNMENT AND BUSINESS. I. 3 hr. PR: Pol. Sci. 2 or consent. An examination of government regulations of the economy dealing with the origin and development of public policies, constitutional and political basis of regulation, relationships between political and economic institutions and processes, and an evaluation of the consequences of regulatory policies. Mr. Hayhurst
221. WEST VIRGINIA GOVERNMENT AND ADMINISTRATION. I, II. 3 hr. A study of the organization and operation of the state government of West Virginia. Mr. Ross
225. MUNICIPAL GOVERNMENT. II. 3 hr. Legal basis, structure, operation, and problems of municipal government and municipal relations with other governmental units. Mr. Hayhurst
226. PROBLEMS FOR STATE AND LOCAL GOVERNMENT. I. 3 hr. An examination of current problems of state, county, and municipal governments. Students are expected to have completed Pol. Sci. 120 or its equivalent. Mr. Ross
231. HISTORY OF POLITICAL PARTIES. I. 3 hr. An examination of the growth of political parties in the United States. Analysis of issues in presidential campaigns as they relate to political party development. Offered in odd-numbered years. Mr. Ross
232. PUBLIC OPINION AND PROPAGANDA. II. 3 hr. Analysis of techniques of sampling and measuring public opinion; detection of propaganda; the nature of propaganda and methods of the propagandist. Offered alternate years. Mr. Ross
233. CURRENT POLITICAL ISSUES. I. 3 hr. An examination of political party platforms and the major issues of the political campaign. Students will be expected to examine background materials thoroughly. Offered even-numbered years. Mr. Ross
234. THE LEGISLATIVE PROCESS. II. 3 hr. Structure and organization of legislative bodies. Powers of legislature. Detailed study of law-making procedures. The influence of outside forces. Offered alternate years. Mr. Ross
241. ADMINISTRATIVE ORGANIZATION AND MANAGEMENT. II. 3 hr. PR: Pol. Sci. 140 or consent. Analysis of administrative organization and reorganization and of such management functions as leadership, planning, coordination, public relations, and management improvement. Offered alternate years. Mr. Stewart
242. FINANCIAL ADMINISTRATION. I. 3 hr. PR: Pol. Sci. 140 or consent. Survey of methods and problems of fiscal management, including budgeting, accounting, tax administration, expenditure control, auditing, purchasing, and financial organization. Offered alternate years. Staff
243. PUBLIC PERSONNEL ADMINISTRATION. II. 3 hr. PR: Pol. Sci. 140 or consent. Survey of the development of public personnel management, with attention to organization, recruitment, classification, training, morale, unionism, and other aspects of personnel administration. Offered alternate years. Staff
244. ADMINISTRATIVE LAW AND REGULATIONS. II. 3 hr. PR: Pol. Sci. 140 or consent. Study of the law of administration, primarily by the case method, covering administrative powers, procedure in administrative adjudication and rule-making, discretion, judicial control, and administrative liability. Offered alternate years. Mr. Gilkey
245. PUBLIC ADMINISTRATION AND POLICY DEVELOPMENT. I. 3 hr. PR: Pol. Sci. 140 or consent. Analysis of decision-making and policy development in the administrative process by the case method. Offered alternate years. Mr. Stewart

250. COMPARATIVE GOVERNMENT. I. 3 hr. An examination of the leading problems of government organization, constitutional framework, political parties and public opinion, and administrative procedures in several countries with emphasis on the United States, United Kingdom, France, Germany, and Russia. The subject is examined topically dealing with each problem in several countries. Mr. Williams
251. MODERN DICTATORSHIPS. II. 3 hr. Politically undemocratic governments. Provides background of dictatorships generally, followed by treatment of several modern dictatorships. Miss Wrinch
252. BRITISH GOVERNMENT AND POLITICS. II. 3 hr. Intensive study of British government with emphasis upon both internal and external policies, primarily during the twentieth century. Offered alternate years. Mr. Williams
253. CONTEMPORARY GOVERNMENTS OF THE COMMONWEALTH. II. 3 hr. A survey of imperial organization and Dominion status; a comparative study of the nature and development of political institutions in Canada, Australia, New Zealand, and South Africa. Offered alternate years. Mr. Williams
254. GOVERNMENTS OF ASIA. I. 3 hr. A survey of contemporary politics and governments of Asia. Mr. Gibson
255. GOVERNMENTS OF LATIN AMERICA. II. 3 hr. A comparative study of the major nations of Latin America. Mr. Gilkey
256. GOVERNMENTS OF THE MIDDLE EAST. I. 3 hr. An examination of governments and political forces of the Middle East. Mr. Rice
261. INTERNATIONAL ORGANIZATION. II. 3 hr. Emphasis will be placed upon agencies created since the close of World War II. Some reference to development of international law and League of Nations. Mr. Rice
262. SPECIALIZED AGENCIES OF THE UNITED NATIONS. II. 3 hr. A detailed treatment of the specialized agencies and related institutions. Mr. Rice
263. PUBLIC INTERNATIONAL LAW. I. 3 hr. Law governing relations among nations, including development of rules, means of enforcement, and conflicts between theory and practice. Mr. White
264. CONDUCT OF AMERICAN FOREIGN RELATIONS. I. 3 hr. An attempt will be made to determine the factors behind our foreign policy with emphasis upon policy during the twentieth century. Mr. Rice
265. BASIC FACTORS IN POWER POLITICS. II. 3 hr. PR: Pol. Sci. 2 or consent. Mr. Rice
266. SOVIET FOREIGN POLICY. I. 3 hr. PR: Pol. Sci. 150 or 160 or consent. Basic concepts about and factors influencing choice in the formulation and execution of Soviet foreign policy; the development and present patterns in Soviet foreign relations with key states and the United Nations; possible problems and prospects in future Soviet relations. Miss Wrinch
272. RECENT AND CONTEMPORARY POLITICAL THOUGHT. I. 3 hr. PR: Pol. Sci. 171 or consent. An examination of integral liberalism and the forces leading to the decline of liberalism and a critical analysis of the fascist and communist ideologies with their threat to the traditions of western civilization embodied in Christianity and conservatism. Mr. Williams
273. AMERICAN POLITICAL THEORY. II. 3 hr. PR: Pol. Sci. 171 or consent. A survey of major political ideas and their influence upon society and government from the seventeenth century to the present. Offered alternate years. Mr. Gibson
274. PROBLEMS IN CONTEMPORARY POLITICAL THOUGHT. II. 3 hr. An intensive study of current trends in political thought through examination of the works of contemporary writers. Offered alternate years. Mr. Gibson and Mr. Williams
- 300, 301. GENERAL SEMINAR IN POLITICAL SCIENCE. I, II. 1 hr. each. Open to properly qualified students in conjunction with Directed Reading and Re-

search Courses for the presentation of papers for critical consideration; some attention will be given to methodology and bibliography. Staff

- 310, 311. DIRECTED READING AND RESEARCH IN AMERICAN NATIONAL GOVERNMENT. I, II. 2-4 hr. each. Mr. Stewart
314. SEMINAR IN AMERICAN NATIONAL GOVERNMENT. I. 3 hr. PR: Consent. Offered every fourth year. Mr. Stewart
- 320, 321. DIRECTED READING AND RESEARCH IN STATE GOVERNMENT. I, II. 2-4 hr. each. PR: Pol. Sci. 120 or consent. Mr. Hayhurst
324. SEMINAR IN STATE AND LOCAL GOVERNMENT. I. 3 hr. PR: Consent. Offered every fourth year. Mr. Hayhurst
- 325, 326. DIRECTED READING AND RESEARCH IN LOCAL GOVERNMENT. I, II. 2-4 hr. PR: Pol. Sci. 225 or consent. Mr. Hayhurst
- 330, 331. DIRECTED READING AND RESEARCH IN POLITICS. I, II. 2-4 hr. PR: Pol. Sci. 130 or consent. Mr. Ross
334. SEMINAR IN POLITICS AND POLICY DEVELOPMENT. I. 3 hr. PR: Consent. Offered every fourth year. Mr. Ross
344. SEMINAR IN PUBLIC ADMINISTRATION. I. 3 hr. PR: Consent. Offered every fourth year. Mr. Stewart
- 346, 347. DIRECTED READING AND RESEARCH IN PUBLIC ADMINISTRATION. I, II. 2-4 hr. each. PR: Pol. Sci. 140 or consent. Mr. Drake and Mr. Stewart
- 351, 352. DIRECTED READING AND RESEARCH IN COMPARATIVE GOVERNMENT. I, II. 2-4 hr. each. Mr. Williams
354. SEMINAR IN COMPARATIVE GOVERNMENT. II. 3 hr. PR: Consent. Offered every third year. Mr. Williams
- 361, 362. DIRECTED READING AND RESEARCH IN INTERNATIONAL RELATIONS. I, II. 2-4 hr. each. Mr. Rice and Miss Winch
364. SEMINAR IN INTERNATIONAL RELATIONS. II. 3 hr. PR: Consent. Offered every third year. Mr. Rice and Miss Winch
374. SEMINAR IN POLITICAL THEORY. II. 3 hr. PR: Consent. Offered every third year. Mr. Gibson or Mr. Williams
- 375, 376. DIRECTED READING AND RESEARCH IN POLITICAL THEORY. I, II. 2-4 hr. each. Mr. Gibson and Mr. Williams
380. THESIS. I, II. 2-6 hr. Staff

SOCIAL WORK

The professional curriculum in social work is on the graduate level and leads to the Master of Social Work degree. The program is accredited by the Council on Social Work Education.

The work toward this degree requires two years of academic residence, beginning in the fall semester of the academic year, and includes the summer terms between the two regular academic years. Students may be admitted to the second year of the program after the satisfactory completion of one year of comparable social work education, if they meet the general requirements for admission to the graduate program.

The curriculum is designed to prepare students for competence in casework practice. Courses in other social work methods are given to supplement the casework content, but are not designed to prepare for specialized practice.

The curriculum is based on the conviction that there are common elements in all social work and that the student who receives the degree will be prepared to practice in almost any social work setting.

FIELD WORK

The two-year graduate curriculum includes alternating periods of study on campus and field work in social agencies. Field work is required of all candidates for the master's degree; it is provided jointly by the University and selected cooperating agencies. The faculty of the Department of Social Work maintains close contact with each student and agency during the blocks of field work education.

Field instruction is usually given in two agencies, with somewhat different programs. First year placements are one semester in length. Second year placements are six months in length, running continuously from late July through January of the student's second academic year.

Placements are made in agencies in West Virginia and nearby states in a wide range of social agencies, hospitals, clinics, and rehabilitation centers.

SCHOLARSHIPS AND EDUCATIONAL STIPENDS

A number of scholarships, traineeships and educational stipends are available for graduate social work students, ranging in value from \$150 to \$2,500 per year. Inquiries concerning these should be made to the Chairman of the Admissions Committee, Department of Social Work.

ADMISSION REQUIREMENTS

Students are admitted for graduate study in the Department of Social Work who meet all the following requirements:

1. Graduation with a bachelor's degree from any accredited college or university.
2. Proof of superior academic capacity and achievement. (The Graduate Record Examination will be required of all those accepted for graduate training and may be required on any application as a prerequisite to the consideration of any application for admission.)
3. Evidence of undergraduate work in the humanities, physical and behavioral sciences sufficient to provide background for graduate study in the Department of Social Work. (Applicants need not have concentrated or majored in Social Work or the Social Sciences in their undergraduate studies, however.)
4. Approval by the Committee on Admissions of the Department, based on the above, and on satisfactory evidence of personal characteristics which give promise of success in the profession of social work.

All students are admitted on the understanding that they will accept the field work assignments made by the Department. The faculty reserves the right to require a student to withdraw because of failure to meet academic or other requirements.

APPLICATION

Application for admission to the Department of Social Work is made on forms which may be obtained from the Department. Prospective students are requested to make application as far in advance of the date they wish to enroll as possible.

REQUIREMENTS FOR THE DEGREE OF MASTER OF SOCIAL WORK

The degree of Master of Social Work is conferred by the University upon those students who satisfactorily complete the requirements as established by the Graduate School. These requirements are:

1. Completion of graduate courses approved by the Department of Social Work totaling not fewer than 54 semester hours, of which the last 30 hours shall have been completed in West Virginia University.
2. Completion of a field work program approved by the Department of Social Work.
3. Demonstration of competence in the theory and practice of social work to the satisfaction of the faculty of the Department. This will include passing a

comprehensive examination at the end of the first year of graduate work and proof of competence for professional practice before the end of the second year of study. The degree will not be awarded solely for credits earned.

General Prerequisites: Twelve semester hours in the behavioral sciences are required for admission to social work courses in the 200 series. The 300 series courses are designed as an integrated program for students who are working toward the M.S.W. degree. Courses are open to other students by consent and as required in their curricula.

212. COMMUNITY SOCIAL WELFARE RESOURCES. II, S. 3 hr. The purpose, structure and function of selected, significant social service agencies in the State and area. Lecture, discussion and readings. In addition, students will spend limited time as volunteers in a selected agency and will report on this experience. Staff
214. INTRODUCTION TO SOCIAL CASEWORK. I and II. 3 hr. PR: 10 hr. in behavioral sciences and current employment in a health and welfare agency. The psychology of client and caseworker and the general character of casework help. Lecture, discussion and analysis of selected case materials. Staff
215. PSYCHOSOCIAL GROWTH AND BEHAVIOR. I. 3 hr. Study of man as a psychosocial, biological entity. Structure and dynamics of personality development. Model of personality. Consideration of common adjustment problems. Staff
221. THE FIELD OF SOCIAL WORK. II, S. 3 hr. A survey of modern social services as offered in various settings: family agencies, medical and psychiatric clinics and hospitals, schools, and settlement houses. Staff
260. CHILD WELFARE. I, S. 3 hr. The physical and mental health needs of children; services provided by public and private agencies to parents and to children who need protection, assistance, foster care, adoption, or services in their own homes; historical background. Mr. Williams
285. INTRODUCTION TO PUBLIC WELFARE. I, S. 3 hr. An introduction to public welfare, including Public Assistance and Old Age Programs, Survivors and Disability Insurance; historical development, administrative structures, perspectives. Mr. Fulton
301. SOCIAL CASEWORK I. I. 3 hr. An introduction to the objectives, basic concepts, generic principles and processes of the social casework method. Staff
302. SOCIAL CASEWORK II. S. 3 hr. Continuation of S.W. 301. Social casework theory; special attention is given to the integration of classroom learning and field practice. Staff
304. COMMUNITY ORGANIZATION. II. 3 hr. Community organization as a professional social work method. Principles, methods and structure of community organization; responsibilities of the social worker in various types of organization. Staff
305. INTRODUCTION TO SOCIAL GROUP WORK. I. 2 hr. Principles and methods used by group workers to help individuals use group relationships for individual growth and improved social functioning. Mr. Sacks
306. THE SOCIAL SERVICES I. I. 3 hr. A study of public and private welfare programs in the United States, generally, and West Virginia and its geographical area, more specifically. The philosophy and history of social services, including European traditions and models. The administrative structure and patterns of financing of social services. Mr. Fulton
307. THE SOCIAL SERVICES II. II. 3 hr. Further analysis and evaluation of social services. Current issues are evaluated in several areas of welfare services. Mr. Fulton
- 311, 312. FIELD WORK. I, II, S. 5 hr. each. Field instruction and practice in selected agencies under general direction of the faculty and under direct supervision of an agency supervisor or faculty members. Staff

314. FIELD WORK. I, II. 1-4 hr. Field instruction and practice in a selected agency, under general direction of the faculty. Supplements S.W. 311 and 312. Staff
315. NORMAL DEVELOPMENT OF THE INDIVIDUAL. I. 3 hr. Man as a psychosocial, biological entity. Normal physical, psychological and social development. Theories of personality structure and dynamics. The mechanisms for maintaining social functioning under stress. Mr. Palacios
317. GROUP PROCESS AND SOCIAL ORGANIZATION. 3 hr. The study of socio-cultural factors influencing behavior. A consideration of role theory; small group theory; the family, social stratification; and the community. To extend the student's knowledge of the contextual aspects of behavior relationships and treatment. Mr. Schneider
320. PSYCHOPATHOLOGY. S. 2 hr. The application of psychodynamic principles to the study of emotional and mental illness. Consideration of the major organic and functional disorders. Staff and Psychiatric Lecturers
322. SOCIAL CASEWORK III. II. 3 hr. An advanced course in casework. Application of theory in varied settings. Relationships to other disciplines. Staff
325. PERSONALITY AND SOCIAL FUNCTIONING. II. 3 hr. PR: Second-year M.S.W. students only. An advanced course in the biological, psychological and social determinants of human behavior with emphasis on social functioning as the measure of adjustment. Staff
- 331, 332. ADVANCED FIELD WORK. I. 5 hr. each. Continuation of S.W. 311, 312, usually in a different setting. Staff
334. ADVANCED FIELD WORK. I, II, S. 1-4 hr. Continuation of S.W. 331 and 332. Designed to supplement S.W. 331 and 332. Staff
351. SOCIAL WORK RESEARCH. I. 2 hr. Introduction to research and the scientific method. The scientific approach to social welfare problems. Elements of research method. Mr. Schneider
352. SOCIAL WORK RESEARCH II. II, S. 2 hr. A continuation of S.W. 351, emphasizing current social work research. Mr. Schneider
361. SOCIAL AGENCY ADMINISTRATION I. I. 2 hr. Basic concepts and principles of the administrative process, the responsibilities of the social caseworker. Administration of social work practices. Democratic group process in administration. Structure and dynamics of the private agency and public welfare unit. Mr. Scher
371. HEALTH, DISEASE, AND DISABILITY. I. 2 hr. Reactions to psychological, biological and social stress. The nature of health and disease. Concepts of adjustment, homeostasis and stress. Mr. Scher
381. PROBLEM REPORT. 1 hr. Required of all candidates for the M.S.W. degree. Staff
382. PROBLEM REPORT II. II, S. 2 hr. Staff
- 390, 393, 395. SEMINAR. II. 3 hr. Intensive study in student's area of specialization. Individual conferences with staff; selected or extensive reading; preparation of a report on the field of specialization. Seminar meetings for all students will supplement individual study. Staff

SOCIOLOGY

Candidates for the Master's Degree in Sociology must have an adequate undergraduate preparation in sociology or make up the deficit by taking courses which will not be credited toward the graduate degree. This latter may mean an additional semester or summer term of study. If not taken for undergraduate credit, Sociology 202, 243, 246 (or equivalents), and a course in statistics will as a rule be included in the master's program. A thesis is required of all candidates for the master's degree.

Except where the student has a strong preparation in sociology, the thesis requirement is in addition to 30 hours of course work. The candidate must pass a final examination, which may be oral, written, or both, at the discretion of the Department. A part of this examination will test the candidate's general comprehension of the field of Sociology.

Recommended graduate minors are economics, history, political science, psychology, or social work.

Sociology 1 or equivalent, or Social Science 1 and 2 are prerequisite for all courses in the 200 series.

202. INTRODUCTION TO SOCIAL RESEARCH. I. 3 hr. Trends in social research; examination and methods and techniques. Mr. Gibbard
205. URBAN SOCIOLOGY. II. 3 hr. Sociological analysis of institutional structure, social values, and individual goals in urban-industrial society; bureaucratization, collectivization, and mass culture; emphasis on political, economic, religious, and family institutions. Mr. Weller
208. THE COMMUNITY. S. 3 hr. An analytical course intended chiefly to provide background data for students interested in programs of community action. Topics to be included are: the basic characteristics of communities; community institutions and resources; social cleavages within the community; and community survey and community planning. Mr. Gibbard
210. MARRIAGE AND THE FAMILY. I, II. 3 hr. Sociological analysis of the contemporary family and its problems. Mr. Kerr
211. SOCIOLOGY OF CHILDHOOD. II. 3 hr. Adjustment of child to American culture. Mr. Kerr
220. SOCIAL CHANGE. I. 3 hr. Sociological analysis of the major changes now going on in our society, of the forces underlying them, and of the tensions to which they give rise. Alternative future directions; rational manipulation and planning for social change. Mr. Weller
224. SOCIAL STRATIFICATION. I. 3 hr. Description and analysis of various types of stratification systems, such as class and caste; social mobility, and status-striving. The course emphasizes the place of status, prestige, and power in the structure of American society. Mr. Silberstein
229. POPULATION AND MIGRATIONS. I. 3 hr. Population theories; growth, composition, and distribution of American population; immigration and culture pluralism; internal migrations and their consequences. Mr. Gibbard
231. RACE RELATIONS. I. 3 hr. Race relations in the U.S. with emphasis on the American Negro. Mr. Gibbard
233. CRIMINOLOGY. I, II. 3 hr. Explanation of crime; critical study of criminal justice, penal methods, and reform movements. Mr. Weller
234. JUVENILE DELINQUENCY II. 3 hr. A scientific study of the nature, extent, and causes of delinquency in the United States. Methods of treatment, correction, and prevention, with emphasis on the work of the juvenile courts. Mr. Weller
235. COLLECTIVE BEHAVIOR. I. 3 hr. Analysis of new group formation and behavior following social dislocation, social unrest, crowd behavior, and other forms of social contagion; the public and public opinion; social movements. Mr. Silberstein
243. INTRODUCTION TO ANTHROPOLOGY. II. 3 hr. Biological history of man, analytical study of social organization, culture, and intellectual life of primitive man. Staff
244. CULTURE AND PERSONALITY. II. 3 hr. Significant interrelations between the individual and his culture. Mr. Silberstein
246. TYPES OF SOCIOLOGICAL THEORY. II. 3 hr. Examination of leading schools of sociological thought in our day. Staff

248. PRIMITIVE SOCIETY. II. 3 hr. Description and analysis of several relatively simple societies; their family life, kinship systems, politics, economies, and religious practices. Staff
250. HUMAN RELATIONS IN INDUSTRY. II. 3 hr. The sociology of industrial relations. The factory or business firm as a social system. Formal and informal relations within the plant. Mr. Gibbard
270. GROUP DYNAMICS. (Same as Psych. 270). I. 3 hr. An interdepartmental course, combining psychological and sociological approaches, in which the dynamics of groups in operation are considered. Mr. Rankin and Mr. Silberstein

Prerequisites for all courses in the "300" series: consent of department chairman.

- 371, 372. THESIS. I, II. 1-6 hr. Staff
391. GENERAL SEMINAR. I, II. 3 hr. Staff
392. GENERAL SEMINAR. I, II. 3 hr. Staff
393. SEMINAR IN SOCIOLOGICAL RESEARCH. I, II. 3 hr. Staff
394. SEMINAR IN SOCIOLOGICAL RESEARCH. I, II. 3 hr. Staff
395. SEMINAR IN SOCIOLOGICAL THEORY. I, II. 3 hr. Staff
396. SEMINAR IN SOCIOLOGICAL THEORY. I, II. 3 hr. Staff

SPEECH

THE DEGREE OF MASTER OF ARTS

Persons who have completed a minimum of 24 semester hours (or 36 quarter hours) of credit in undergraduate speech courses and possess a bachelor's degree from an accredited college or university may be admitted to the program. Any deficiencies in undergraduate speech credits will be made up either without credit or added to the credit required for the degree.

Department of Speech requirements for the achievement of the Master of Arts degree are as follows:

1. Successful completion of the minimum number of required graduate hours as set forth in Program "A" or Program "B" below.
2. Demonstration of personal proficiency through the successful passage of a performance test set up by the Department in terms of the student's educational objectives and program of study.
3. Completion, within the framework of the Graduate School and Departmental standards, of one of the two following programs of study:
 - A. Concentration program which meets the following requirements:
 - (1) Successful completion of a minimum of 30 semester hours of graduate credit, 24 of which may be in one speech field or in a combination of two speech fields, (chosen from interpretation, public address, radio and television, speech correction and audiology, and theatre).
 - (a) Speech 301 and one seminar are required within the framework of the 30 semester hours minimum total.
 - (b) No more than 6 semester hours in Independent Study, Research, and Thesis may be applied in meeting the 30 semester hour minimum total.
 - (c) No more than 6 semester hours in a cognate field may be used in computing the 30 semester hour minimum total required under this program.
 - (2) Successful passage of comprehensive written examination in the fields of study. Such examinations are administered toward the end of the student's course work and then only if and when the student has a "B" grade-point average or 75 per cent of his credit hours are of "B" grade or higher.

- (3) Submission for approval by the student's graduate committee of a thesis demonstrating original research and scholarly reporting.
- (4) Successful completion of an oral examination on the thesis.
- B. General program which meets the following requirements:
 - (1) Thirty-six hours of speech or cognate courses with no fewer than 30 semester hours in Speech.
 - (2) Successful passage of comprehensive examinations, both written and oral, in all areas of speech (interpretation, public address, radio and television, speech correction and audiology, and theatre). Either a 3.0 (B) grade-point average or 75 per cent of "B" grades for the hours carried is prerequisite to taking written comprehensive examinations.

THE DEGREE OF MASTER OF SCIENCE

Persons holding a baccalaureate degree from an accredited institution may be admitted to graduate study as ultimate candidates for the degree of Master of Science (concentration area in Speech Correction and Audiology) who meet *one* of the three following requirements *and* requirement No. 4.

1. An undergraduate major in speech, or an undergraduate minor in speech, provided there is a distribution of courses constituting a reasonable sampling of the various speech areas.
2. The equivalent in academic hours of an undergraduate major in speech, or of the qualified minor, accumulated in completing requirements for the baccalaureate degree.
3. At least two years of practical experience of a professional nature in those areas of human relations identified with psychology, sociology, the medical and related sciences (viz., nursing, laboratory technicians, etc.), and teaching.
4. Approval by the Department of Speech Committee on Admissions which will consider such items as the applicant's record of academic achievement, normalcy of speech and hearing, habits of work, personality, sense of responsibility requisite to success in the field, and willingness to pursue a Committee-specified enrichment program when needed.

Departmental requirements for the achievement of the Master of Science Degree are as follows:

1. Completion of a total of 42 semester hours (exclusive of the thesis) of graduate courses divided as follows: 30 hours distributed over the areas of phonetics, stuttering, organic functional difficulties, audiometry, hard of hearing therapy, problems of the aurally handicapped, and a speech seminar in one of these areas, and 12 hours in the related fields of statistics and psychology.
2. Creditable completion of a total of 240 clock hours of supervised therapy divided as follows:
 - A. For those wishing to work in a school system, 180 hours of supervised therapy within the school framework and 60 hours within another type of clinical organization.
 - B. For those wishing to work in other than a school system, 180 hours of supervised therapy in non-school clinical situations, and 60 hours within the school framework.

NOTE: If at completion of the allotted hours of supervised clinical work, the student's supervisor feels that more experience is needed, additional hours of supervised clinical work will be required until the student reaches an acceptable standard of proficiency.

3. A thesis demonstrating original research and scholarly reporting.
4. Successful passage of an oral examination on the thesis.
5. Successful passage of written comprehensive examinations in the fields of study.

NOTE: No graduate student in the Department of Speech shall be considered a candidate for the master's degree until having successfully passed comprehensive examinations in his fields of study.

THE DEGREE OF DOCTOR OF EDUCATION IN SPEECH CORRECTION AND/OR AUDIOLOGY

The Degree of Doctor of Education is offered in cooperation with the College of Education. Admission to the Graduate School and enrollment in graduate courses do not themselves imply acceptance of the applicant for a Doctor of Education Degree.

For College of Education prerequisites to admission, prerequisites to candidacy, and requirements for the degree see page 127 Departmental exceptions and additions to these general requirements are as follows:

In addition to the general College of Education prerequisites to admission, the applicant must satisfy a Department of Speech Faculty Committee in the following:

- A. Possession of Basic Certification in the American Speech and Hearing Association, or its equivalent.
- B. Normalcy of the applicant's speech and hearing.
- C. Personal qualifications necessary to success in the field.

Curricular Requirements for Completion of the Degree. The exact amount and nature of course work to be undertaken by a candidate will be determined in the light of his previous preparation and the demands of his chosen field of application. The aggregate of courses of graduate study shall be not fewer than 75 semester hours, exclusive of the dissertation, of which a minimum of one-half of the semester hours in Education and a minimum of one-half of the semester hours in Speech Correction and/or Audiology and a minimum of one-half of the semester hours in Psychology shall be on the 300 level. Not more than 12 of the 75 hours may be earned in extension and/or practicum or field work. The program of course work shall include a minimum of 24 semester hours in Education, a minimum of 36 hours in Speech Correction and/or Audiology, and a minimum of 15 hours in Psychology. These courses shall be so ordered and distributed as to promote broad and systematic knowledge and the ability to prosecute independent research.

Candidates having an earlier graduate degree or its equivalent from West Virginia University will be required to complete a prescribed minimum of resident graduate work in one or more other institutions.

Time Limitation. Requirements for the Doctor of Education Degree must be completed within seven years of admission to candidacy.

Basic Course Requirements: (Specialization in Speech Correction)

	Hr. (Min.)*
From the Field of Education	24
From the Field of Speech Correction	36
Basic Areas	9-12 hr.
Specialized Professional Courses	21-24 hr.
Audiology Courses	6-9 hr.
Clinical Practicum	335 clock hours**
From Psychology	15
TOTAL	75

Basic Course Requirements: (Specialization in Audiology)

From the Field of Education	24
From the Field of Audiology	36
Basic Areas	9-12 hr.
Specialized Professional Courses	21-24 hr.
Speech Correction Courses	6-9 hr.
Clinical Practicum	335 clock hours**
From Psychology	15
TOTAL	75

NOTE: For detailed selection of courses see following pages.

*Beyond the Baccalaureate Degree. A maximum of 24 semester hours of credit achieved in fulfillment of the Master's Degree may be counted toward these totals.

**Includes A.S.H.A. Basic Certification requirement of 200 clock hours, which will be deducted from the total if already accumulated by the candidate.

INTERPRETATION

200. ART OF STORYTELLING. I or II. 2 hr. PR: Consent. Principles involved in effective presentation of stories, with practical experience in classroom and before audiences. Stories of all types for adults and children studied. Mr. Welden
203. PROFESSIONAL READING. I, II. 3 hr. PR: Speech 104 and consent. Intense training in interpretation. Designed to meet needs of individual. Full length public recital prepared and presented. Limited enrollment. Mr. Neel
205. ADVANCED PROBLEMS IN INTERPRETATION. II. 3 hr. PR: Speech 29 and consent. Designed to deal with individual problems of advanced students in interpretation. Mr. Neel

PUBLIC SPEAKING

220. SPEECH COMPOSITION. II. 2 hr. PR: Speech 11 and consent. Materials of speech, organization, and style; application to delivery. Mr. Henning
221. PERSUASION. I. 3 hr. PR: Speech 11 and consent. Study and practice in identification of factors motivating human behavior and belief, how to secure and hold attention, the uses of suggestion, the dramatization of ideas. Application to advertising and writing as well as speaking. Adapted to needs of pre-law, commerce, and journalism students. Mr. Henning
222. FORMS OF PUBLIC ADDRESS. II. 2 hr. PR: Consent. Composition and delivery of the oration, political speech, speech of introduction, dedicatory address, and eulogistic speech. Mr. Welden
223. ADVANCED GROUP DISCUSSION. II. 2 hr. PR: Consent. Application of the principles and practices of group discussion to classroom teaching, the conference tables, committee work, policy-determining groups, and the public forum. Opportunities for participation by members of the class using current national and international problems. Mr. Welden and Mr. Davis
225. INTERSCHOLASTIC FORENSICS. S. 2 hr. PR: Consent. Interscholastic public-speaking activities with emphasis upon types commonly termed original speech, such as debate, oratory, and extemporaneous speaking. Opportunity for performance in each type will be provided. Mr. Henning and Mr. Welden
330. HISTORY OF RHETORIC. I. 3 hr. PR: Consent. Critical study of rhetoric from classical times to the present. Mr. Henning
335. HISTORY OF AMERICAN PUBLIC ADDRESS. II. 3 hr. PR: Consent. Critical study of leading American speakers, their biographies, speeches, and issues with which they dealt. Mr. Welden
339. SEMINAR: PROBLEMS IN SPEECH. I, II. 3 hr. Mr. Henning

RADIO AND TELEVISION

240. RADIO AND TELEVISION DRAMATIC WRITING. II. 2 hr. PR: Speech 140 and 144 or consent. Dramatic script, documentaries, poetry programs, serial dramas, and children's shows for commercial and educational purposes. Scripts are written to be aimed at definite markets. Mr. Rockenstein
242. RADIO WORKSHOP. I. 2 hr. PR: Speech 140 or consent. Lecture and laboratory in analysis, casting, rehearsal, and production of talk shows, interviews, roundtable forums, popular and classical music shows, variety shows. Students in this class will serve as assistants in the preparation of radio programs for the University Office of Educational Broadcasting. Mr. Rockenstein
243. TELEVISION WORKSHOP. I. 2 hr. PR: Speech 140 or consent. Mainly laboratory experience in production of television programs. Students in this class will serve as assistants in the preparation of television programs for the University Office of Educational Broadcasting. Mr. Burrows

244. RADIO AND TELEVISION PROGRAM PLANNING. II. 2 hr. PR: Speech 140 and consent. Analysis of the purpose and basic idea of a program in relation to audience composition. Requirements of effective structure. Practice in laying out program formats for all types of radio and television programming.
Mr. Burrows
348. SEMINAR: PROBLEMS IN RADIO. II. 3 hr. PR: Consent.
Mr. Rockenstein
349. SEMINAR: PROBLEMS IN TELEVISION. I, II. 3 hr. PR: Consent.
Mr. Burrows
- NOTE: For additional courses of training for television, refer to Speech 6, Speech 162, Speech 260, Speech 261, Speech 263, Speech 264, and Speech 267.

SPEECH CORRECTION AND AUDIOLOGY

250. SURVEY OF ORAL COMMUNICATION DISORDERS. I. 3 hr. PR: Consent. A survey of basic concepts and principles of the disorders of speech and their treatment. Primary attention is given to the more common speech deviations. Students observe examination and corrective methods of therapists in the clinic and schools. Normal speech and hearing development of children is considered. This is an orientation course for students majoring in speech as well as teachers, school administrators, psychologists, and rehabilitation workers.
Mrs. Thomas
252. STUTTERING. I. 3 hr. PR: Speech 250, 251 and consent. Theories and therapies of stuttering.
Staff
253. INTRODUCTION TO AUDIOLOGY. II. 3 hr. PR: Consent. General orientation to the field of audiology and the specialties which are included. A survey of the problems of the hearing-handicapped individual, basic hearing measurements procedures, and general goals of hearing therapy.
Mr. Wasson
254. APPLIED PHONETICS. I. 3 hr. PR: Speech 3, 250, or consent. A study of the standard speech sounds in our language. Use of symbols for recording speech sounds; application of the use of such symbols in representing various usages of speech; special emphasis on analyzing and recording defective speech. Dynamic concepts studied.
Mrs. Thomas
255. HARD OF HEARING THERAPY. II. 3 hr. PR: Speech 272 and consent. Bases and procedures of acoustic training and speech reading.
Mr. Wasson
256. ANATOMY OF THE SPEECH AND HEARING MECHANISM. I. 4 hr. PR: Consent. Anatomical and physiological study of the vocal mechanisms and the ear. Staff
257. CLINICAL PRACTICE. I, II. 2-3 hr. PR: Admittance only by consent. Supervised therapy of speech and/or hearing disorders.
Mrs. Thomas
258. CLINICAL PRACTICE. II. 2-3 hr. PR: Speech 257 and consent. Supervised therapy of profound speech and/or hearing disorders.
Mrs. Thomas
259. ADVANCED SPEECH CORRECTION. II. 3 hr. PR: Speech 250, 251, 254, 256, and consent. Introductory study of the speech-retarded child and organically-based speech disorders including cleft palate, cerebral palsy, aphasia, esophageal speech, and phonation difficulties.
Staff
271. DIAGNOSTIC AUDIOMETRICS. II. 3 hr. PR: Speech 253 and consent. A study of the various audiometric and speech reception tests outlining the dimensions of hearing. Experience in test administration and interpretation.
Mr. Wasson
272. BASES OF AURAL REHABILITATION FOR CHILDREN AND ADULTS. I. 3 hr. PR: Speech 253, 271 and consent. Study of the perceptive and behavioral problems of aurally handicapped individuals in society, and approaches to methods of alleviating and compensating for hearing loss.
Staff
273. PROFOUND ORGANIC SPEECH DISORDERS. II. 3 hr. PR: Speech 259 and consent. Advanced study of any one or several organically caused disorders introduced in Speech 259.
Staff

275. SPEECH PROBLEMS OF CHILDREN. II. 3 hr. PR: Consent. Normal development of speech habits in children. Diagnostic and remedial procedures for speech defects. Relationship between speech and allied activities such as reading, spelling, and disciplinary problems. Mr. Henning
277. ADVANCED CLINICAL PRACTICE. I. 2 hr. PR: Speech 258. Staff
278. ADVANCED CLINICAL PRACTICE. II. 2 hr. PR: Speech 277. Staff
350. EXPERIMENTAL PHONETICS. I. 3 hr. PR: Speech 254 and consent. Investigation of problems of phonetics as they are related to functional speech. Instruments used in sound analysis and an investigation of various aspects of architectural acoustics. Mr. Wasson
351. PROBLEMS IN SPEECH PATHOLOGY. II. 3 hr. PR: Consent. The speech pathologist as a diagnostician and therapist in interdisciplinary investigations. Examination of counseling procedures, administrative practices in varied setting and organization of programs for various pathologies of speech. Staff
352. ADVANCED SPEECH PATHOLOGY. II. 3 hr. PR: Speech 250 and consent. Theories of causation and therapies for delayed speech development, cleft palate speech, and cerebral palsy speech. Staff
353. NEUROPATHOLOGIES OF SPEECH AND LANGUAGE. I. 3 hr. PR: Speech 250, 256, 273, or consent. Speech and language disturbances related to brain injury or maldevelopment. Consideration of the neurological bases, pathologies and psychological factors involved in the loss or lack of development of speech and language. Staff
357. SEMINAR: PROBLEMS IN AUDIOLOGY. II. 3 hr. PR: Speech 253, 271, 272. Topics vary from term to term to meet student needs. Emphasis will be an advanced concepts in audiological diagnosis, aural rehabilitation and noise in industry. Mr. Wasson
358. ACOUSTIC INSTRUMENTATION. I. 3 hr. PR: Speech 253, 271. Principles of electronic design utilized in clinical auditory testing and amplification. Evaluation and assessment of hearing aids in aural rehabilitation. Mr. Wasson
359. SEMINAR: SPEECH PATHOLOGY. I, II. 2 hr. PR: 9 hr. of speech re-education courses and consent. Staff

THEATER

260. ADVANCED ACTING. II. 2 hr. PR: Speech 6, 165, and consent. Characterization, script analysis, style, theories, and techniques. Designed to meet needs of individual student. Mr. Boyd
261. THEATRICAL DIALECTS. I. 2 hr. PR: Consent. Study and mastery of twelve common dialects used in theater and radio. Mr. Boyd
262. PLAYWRITING. II. 2 hr. PR: Speech 165 and consent. Development of creative ability in dramatic composition. Study of techniques and problems of playwright. Of cultural value, but primarily a writing course. Staff
263. SCENE DESIGN. II. 2 hr. PR: Consent. Lecture and laboratory in theories of scene design for stage and television, including actual construction of designs. Open to juniors, seniors, and graduate students. Mr. Burrows
264. ADVANCED PLAY DIRECTING. II. 2 hr. PR: Speech 162, either Speech 161 or 164, and consent. Emphasis on work of directing as an integrating artist. Display of high level of proficiency in direction of a one-act play required of all students enrolled. Mr. Boyd
265. HISTORY OF THEATER. I. 2 hr. PR: Speech 165 and consent. Historical survey of theatre from primitive times to present. Includes both oriental and occidental theatres. Mr. Neel
267. ADVANCED SCENERY AND LIGHTING. I, II. 2 hr. PR: Speech 161 and consent. A more technical study of scenery and lighting problems than is offered in

Speech 161. Students are given opportunity for laboratory study through independent investigation and work on University Players' productions.

Mr. Burrows

268. CREATIVE DRAMATICS. I. 2 hr. PR: Speech 6 or consent. The study and practice of creative dramatic activity as a method of learning and self development for children. Mr. Ford and Mr. Boyd

368. SEMINAR: PROBLEMS IN THEATRE. I, II. 3 hr. PR: Consent. Mr. Boyd

RELATED COURSES

270. PSYCHOLOGY OF SPEECH. II. 3 hr. PR: 6 hr. of psychology and 18 hr. of speech. Psychological principles involved in speech situation. Analysis or roles of emotion, habit, learning judgment, rating, and imagery in speech.

Mr. Henning

301. RESEARCH PROBLEMS AND METHODS. I. 3 hr. PR: Graduate standing. Required of all candidates for Master's Degree in speech. Mr. Henning

370. RESEARCH. I, II. 1-3 hr. PR: Speech 301, a speech seminar, and consent of chairman of department. For graduate students in speech.

Mr. Henning and Staff

375. INDEPENDENT STUDY. I, II. 1-3 hr. PR: Speech 301, a speech seminar, and consent of chairman of department. Open to graduate students in speech who are pursuing independent problems in that field. Mr. Henning and Staff

399. THESIS. I, II. 2-4 hr. Mr. Henning and Staff

COMMERCE

The College of Commerce offers two graduate programs. One leads to the degree of Master of Business Administration (M.B.A.). The other leads to the Master of Science degree with a major in either Economics or Business Administration.

MASTER OF BUSINESS ADMINISTRATION (M.B.A.)

A candidate for the Master of Business Administration degree must have completed the following courses at an accredited undergraduate college or university:

Principles of Accounting (2 semesters)

Principles of Economics (2 semesters)

Principles of Marketing

Industrial Management

Business Finance

Business Statistics

An undergraduate average of 2.5 (C+) or higher is required for admission to the program. In exceptional cases students without the necessary prerequisites or with averages below 2.5 may be admitted on probation, subject to correction of deficiencies at the beginning of the program and demonstration of ability to do satisfactory graduate work. Deficiencies in undergraduate preparation must be removed without credit. All students admitted on probation will have their records reviewed at the end of 12 hours of graduate work to determine whether they should be admitted to candidacy, continued on probation, or eliminated from the program.

A program of courses will be planned by the candidate with his faculty adviser and subject to the approval of his adviser. The M.B.A. degree requires a total of 36 hours of graduate credit. A grade-point average of at least 3.0 (B) is required on all courses taken as a graduate student at the University, including prescribed work completed to remove undergraduate deficiencies. A grade below "C" in any course taken while enrolled as a graduate student in the College of Commerce will result in suspension from the graduate program of the College.

The following courses are required for all candidates, exceptions requiring the approval of the M.B.A. committee:

Accounting 301—Managerial Control
 Economics 301—Managerial Economics
 Economics 302—Research and Reports
 Management 301—Administrative Practices
 Management 313—Production Administration
 Marketing 313—Marketing Administration
 Finance 313—Financial Administration
 Management 323—Seminar in Business Policy

The candidate will also complete 12 semester hours of elective courses selected with the approval of his adviser. Of these electives, no more than 9 hours may be taken outside the College of Commerce. No thesis is required, but writing is emphasized in all courses. During his last semester in residence the candidate must pass a comprehensive written examination covering material in the required courses. This examination may be repeated only once.

MASTER OF SCIENCE (M.S.)

A candidate for the Master of Science degree must have previously completed a minimum of 18 semester hours of upper-division courses in economics or business administration at an accredited university or college. He must have satisfactorily completed a course in statistics and have a minimum grade-point average of 2.5 (C+) as an undergraduate. Additional courses prerequisite for the work the student expects to pursue may be required.

In exceptional cases students without the necessary prerequisite courses or with averages below 2.5 may be admitted on probation, subject to correction of deficiencies at the beginning of the program and demonstration of ability to do satisfactory graduate work. Deficiencies in undergraduate preparation must be removed without credit.

A program of courses will be planned by the candidate with his faculty adviser and subject to the approval of his adviser. The M.S. degree requires 30 semester hours of graduate credit, including an acceptable thesis. No more than 6 semester hours of work may be taken outside the College of Commerce. A grade-point average of at least 3.0 (B) is required on all courses taken as a graduate student at the University, including prescribed work completed to remove undergraduate deficiencies. A grade below "C" in any course taken while enrolled as a graduate student in the College of Commerce will result in suspension from the graduate program of the College.

Candidates for the M.S. degree with a major in Economics should take the following courses if they have not already completed them:

Economics 220—Introduction to Quantitative Analysis
 Economics 221—Economic Theory
 Economics 222—History of Economic Thought
 Economics 235—Economic Growth and Business Cycles
 Economics 241—Public Finance
 Economics 319—Seminar in Economics

Candidates for the M.S. degree with a major in Business Administration should take at least 9 hours of 300 level courses in addition to thesis credits. If they have not already completed them, they should include the following courses in their graduate programs:

Economics 220—Introduction to Quantitative Analysis
 Economics 221—Economic Theory or
 Economics 301—Managerial Economics
 Management 225—Business Policy or
 Management 323—Seminar in Business Policy

ACCOUNTING

213, 214, INCOME TAX ACCOUNTING. I, II. 3 hr. per sem. PR: Accounting 112. Tax theory and practice as developed from regulations of the Internal Revenue Service; problems in preparation of tax returns for individuals, partnerships, and corporations. Mr. Skaggs

216. ADVANCED COST ACCOUNTING. II. 3 hr. PR: Accounting 115. Advanced work in the application of cost theory and procedures to cases and problems which emphasize the managerial use of cost information. Mr. Dennler
217. AUDITING THEORY. I. 3 hr. PR: Accounting 112. Auditing fundamentals; objectives, standards and procedures; introduction to working-paper techniques; procedure statements of the American Institute of CPA's. Mr. Vincent
218. AUDITING PRACTICE. II. 3 hr. PR: Accounting 217. Application of auditing theory and procedures, with emphasis on decisions which involve judgment and are important in independent audits; audit working papers and reports; case studies. Mr. Skaggs
220. ACCOUNTING SYSTEMS. I. 3 hr. PR: Accounting 112. The adaption of accounting procedures to the demands of the firm, with emphasis on theoretical factors important to efficiency and internal control; system surveys and reports, the design of forms, office machine applications. Mr. Dennler
224. ADVANCED ACCOUNTING PROBLEMS. II. 3 hr. PR: Minimum of 18 hr. in accounting with an average grade of "B" or higher. Analysis and solution of representative C.P.A. problems. Mr. Vincent
230. ADVANCED ACCOUNTING THEORY. II. 3 hr. PR: Accounting 112, 115, and consent. A critical analysis of accounting concepts and standards with emphasis on their origin, development, and significance. Mr. Vincent
301. MANAGERIAL CONTROL. II. 3 hr. PR: Economics 125. The use and significance of the quantitative techniques of accounting, statistics, and budgeting for planning, control, and decision making. Mr. Dennler
- 331, 332. THESIS. I, II. 2 or 3 hr. Staff

ECONOMICS

205. CURRENT ECONOMIC PROBLEMS. S. 3 hr. PR: Economics 1 and 2 or consent. For students in Education only. A course designed to acquaint public school teachers with reliable source material in economics and to instruct them in studying current economic problems. Mr. Campbell
209. PROBLEMS IN ECONOMICS. I, II. 1-3 hr. Staff
210. COMPARATIVE ECONOMIC SYSTEMS. II. 3 hr. Structure and processes of existing economic systems throughout the world including review of basic principles of free enterprise, socialistic, communistic, and fascistic societies. Comprehensive analysis based on current and recent experiments in these economies. Mr. Mischaikow
217. TRADE UNIONISM. I. 3 hr. PR: Economics 115 or consent. An analysis of the structure, government, attitudes, and policies of organized labor; the implications of union policy. Mr. Gavett
218. COLLECTIVE BARGAINING. II. 3 hr. PR: Economics 115 or consent. Theory and practice of collective bargaining; including contract issues, types of relationships, and the role of government policy. Mr. Gavett
219. THE ECONOMICS OF WAGES AND THE LABOR MARKET. II. 3 hr. PR: Economics 115 or consent. The determination of wage levels and structure; the functioning and organization of labor markets. Mr. Gavett
220. INTRODUCTION TO QUANTITATIVE ANALYSIS. I. 3 hr. PR: Economics 125. Study of the principal mathematical techniques employed in economic analysis; an introduction to econometrics. Mr. Braff
221. ECONOMIC THEORY. I. 3 hr. Training and experience in use of analytical methods and techniques needed in dealing with fundamental economic problems. Mr. Braff
222. HISTORY OF ECONOMIC THOUGHT. II. 3 hr. Economic ideas in perspective of historic development. Mr. Thompson

225. TRANSPORTATION. I. 3 hr. Development of an inland transportation system and relations and policies of transport agencies. Mr. Campbell
230. PUBLIC UTILITIES. II. 3 hr. Development of regulation; economics of valuation and rate making. Mr. Campbell
235. ECONOMIC GROWTH AND BUSINESS CYCLES. I. 3 hr. PR: Economics 125 or consent. Industrial fluctuations; causes and possible remedies. Mr. Fishman
241. PUBLIC FINANCE. I. 3 hr. Government fiscal organizations and policy; taxes and tax systems with particular emphasis upon the Federal Government and the State of West Virginia. Mr. Alvis
245. GOVERNMENT AND BUSINESS. II. 3 hr. Government in its role of adviser and umpire; analysis of governmental policies and practices affecting business. Mr. Newhouse
250. INTERNATIONAL TRADE. II. 3 hr. PR: Consent. Development of trade among nations; theories of trade; policies; physical factors; trends; and barriers. Mr. Alvis
251. ECONOMIC DEVELOPMENT. II. 3 hr. A comprehensive study of the problems, changes, and principal policy issues faced by non-industrialized countries in the process of economic development. Mr. Mischaikow
256. ADVANCED STATISTICS. II. 3 hr. PR: Economics 125 or equiv. Correlations, index numbers, time series analysis, statistical inference, and population forecasting. Mr. Braff
301. MANAGERIAL ECONOMICS. II. 3 hr. An analysis of markets and the problems of management in appraising business conditions and in adjusting to changes in production demand, cost, level of output, and profits. Staff
302. RESEARCH AND REPORTS. I. 3 hr. A study of sources of business information and research procedures, with application in the preparation of reports. Mr. Coleman
310. CONTEMPORARY ECONOMIC THEORY. II. 3 hr. PR: Economics 221. Recent developments in economic theory such as those relating to imperfect competition, monetary problems, and collectivist economy. Staff
315. BIBLIOGRAPHY AND RESEARCH. I. 2 hr. Sources of information; research procedures; analysis and interpretation of data; preparation of manuscripts. Mr. Coleman
319. SEMINAR IN ECONOMICS. II. 3 hr. Mr. Fishman
320. QUANTITATIVE ANALYSIS. II. 3 hr. PR: Economics 220. Econometrics and an examination of mathematical models employed in economic analysis, such as linear programming, input-output analysis, game theory, and statistical decision making. Mr. Braff
- 331, 332. THESIS. I, II. 2 or 3 hr. Staff

FINANCE

216. CASUALTY INSURANCE. II. 3 hr. PR: Finance 115. An analysis of liability, automobile, accident and health, workmen's compensation, and other casualty coverages. The forms and operations of casualty carriers, theories and methods of rating the casualty lines, and insurance regulation as it affects casualty coverages. Mr. Wright
217. PROPERTY INSURANCE. I. 3 hr. PR: Finance 115. An analysis of fire, marine, and inland marine insurance with particular reference to the theories of underwriting used in these lines. The case method of study is utilized. Mr. Wright
313. FINANCIAL ADMINISTRATION. II. 3 hr. PR: Finance 111. A study of problems in business finance including those related to the financial structures of corporations and the working-capital and fixed-capital needs of a firm. Mr. Newhouse
- 331, 332. THESIS. 2 or 3 hr. Staff

MANAGEMENT

213. PROBLEMS IN BUSINESS ADMINISTRATION. I, II. 1-3 hr. Staff
216. PERSONNEL MANAGEMENT. I, II. 3 hr. PR: Economics 115. Principles and practices in the direction, coordination, and remuneration of manpower. Mr. Isaack
225. BUSINESS POLICY. I, II. 3 hr. PR: Senior standing and consent. Integrated study of policies, organization, facilities, and control techniques of business enterprises. Mr. Coleman
301. ADMINISTRATIVE PRACTICES. I. 3 hr. PR: Management 111. A study of the function of supervision and the problem of human relationships in complex situations. Mr. Isaack
313. PRODUCTION ADMINISTRATION. I. 3 hr. PR: Management 111. A study of the problems of planning, organizing, and controlling manufacturing activities as a background for the analysis of complex management problems. Mr. Hamelman
323. SEMINAR IN BUSINESS POLICY. II. 3 hr. PR: Consent. An integrated study of policies, organization, facilities, and control techniques of business enterprises. Mr. Coleman
- 331, 332. THESIS. I, II. 2 or 3 hr. Staff

MARKETING

210. INDUSTRIAL PURCHASING. I. 3 hr. PR: Marketing 111. A survey of corporate procurement problems facing modern purchasing executives. Mr. Roberts
215. MARKETING RESEARCH. II. 3 hr. PR: Consent. The utilization of present-day marketing research techniques in the solution of practical marketing problems, with particular reference to West Virginia. Mr. Roberts
313. MARKETING ADMINISTRATION. I. 3 hr. PR: Marketing 111. The analysis of problems met by management in distributing goods and services efficiently to consumers. Mr. Crooks
- 331, 332. THESIS. I, II. 2 or 3 hr. Staff

EDUCATION

Through its undergraduate and graduate courses, its seminars, its laboratory school, its cooperating public schools, its field services, and its encouragement and direction of educational investigation, the College of Education aims to contribute to educational efficiency by inculcating a liberal and more scientific conception of the functions of public schools and by providing the professional training of elementary-school and secondary-school teachers, principals, and supervisors, general school administrators, college teachers, educational counselors, and educational research specialists.

The College of Education comprises the College with its resident courses of instruction and its facilities for research; University High School with its opportunities for observing, student teaching, directed supervision, and experimentation; and cooperating public schools for supervised student-teaching experience.

The College of Education is "accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary teachers, secondary teachers, school service personnel, and school administrators, with the Doctor's degree as the highest degree approved."

MASTER OF ARTS

REQUIREMENTS FOR ADMISSION TO GRADUATE WORK IN EDUCATION

It is the responsibility of all applicants for admission to the Graduate School and all candidates for graduate degrees, certificates, and other such recognitions to conform to the general regulations of the Graduate School as published on pages 28-30.

REQUIREMENTS FOR ADMISSION TO CANDIDACY FOR THE MASTER'S DEGREE IN EDUCATION

Admission to the Graduate School and to graduate work in education do not constitute admission to candidacy for a master's degree. Graduate students shall apply to the *Committee on Admissions* for admission to candidacy for the master's degree in Education. Applicants who have undergraduate averages the equivalent of 2.5 or better may be admitted to candidacy when they have met the following requirements:

1. A first-class teaching certificate or at least 17 semester hours of approved undergraduate credit in Education.

2. A maximum of 14 semester hours of graduate credit completed prior to admission to candidacy. At least 6 of these hours must be in Education and must have been taken in residence at West Virginia University. *Students can take no more than 8 hours in extension prior to their enrollment in residence at the University.*

3. A satisfactory score on preliminary examinations in general ability and written English.

4. A minimum of one year's teaching experience for administrative programs, such as principals, superintendents, and supervisors.

5. A candidate for an administrative program must secure written approval from the adviser in order to be admitted to the program.

The *Committee on Admissions*, appointed by the Dean of the College of Education, will consider individually those applicants for admission to candidacy who do not meet these criteria.

A candidate conditionally admitted, who, upon the completion of a maximum of 15 semester hours of graduate work in residence, has not achieved a grade-point average of 2.5 or better, shall not be admitted to a program of study leading toward a master's degree in Education.

OPTIONAL ROUTES TOWARD A MASTER'S DEGREE IN EDUCATION

- A. Thirty semester hours, including Ed. 301 and 6 semester hours of research (Education 361, Thesis) and the remaining hours in approved course work. Examination (oral, written, or both, at the discretion of the individual members of the committee) by the candidate's advisory committee.

- B. Thirty semester hours, including Ed. 301 and 3 semester hours of research (Ed. 360, Problem), selected in conference with the candidate's committee, directed by the adviser, with final approval by the committee, and 27 semester hours of approved course work. Examination (oral, written, or both, at the discretion of the individual members of the committee) by the candidate's advisory committee.

- C. Thirty-six semester hours, including a minimum of 10 semester hours of approved course work outside the field of Education. Examination (oral, written, or both, at the discretion of the individual member of the committee) by a committee of at least three.

NOTE: A candidate who fails the final Master's Degree examination may, upon written consent of his examining committee, be given a second examination not earlier than the following term or semester. A candidate who fails the second examination may, upon written request and with the unanimous consent of his committee, be given a third and final trial no earlier than one calendar year from the date of his second examination.

SPECIAL REQUIREMENTS FOR THE MASTER'S DEGREE IN EDUCATION

1. No student may be awarded a Master's Degree in Education unless the student has a minimum grade-point average of "C" (2.0) on all work taken for graduate credit. (A grade of less than "C" does not carry credit toward a graduate degree, but will be counted in determining the grade-point average.)
2. No student will be permitted to repeat a required graduate course more than once.

NOTE: All persons working toward administrative certificates in Education or who wish to add additional administrative certification shall be required to pass the screening examination required of all candidates for the Master's Degree in Education.

GRADUATE ADVISERS

Each Education student enrolled in the Graduate School will be directed by the appropriate one of the following advisers:

- Mr. Allen: Vocational Education and Audio-Visual Education.
- Mr. Bell: Elementary-School Principals.
- Mrs. Booth: Graduate Specials.
- Mr. Brennan: Industrial Education.
- Mr. Butler: Agricultural Education.
- Mr. Cook, Mr. Bailey, and Mr. Gunselman: Secondary-School Classroom Teachers.
- Mr. Harrah: Administration and Supervision.
- Mr. Hofstetter: Supervisors.
- Mr. Jarecke and Mr. Wagner: Guidance.
- Mr. Katz and Mrs. Cunningham: Elementary-School Classroom Teachers.
- Mr. Kennedy: Reading and Language Arts.
- Mr. Miller: Secondary-School Principals.
- Mr. Neff: Special Education.
- Mr. Taylor: Elementary and Secondary Teachers.

GRADUATE PROFESSIONAL CURRICULA

CURRICULUM FOR SUPERINTENDENTS¹

Degree: Master of Arts

<i>Required Courses</i>	24 Hr.
Ed. 203. Organization and Administration of Adult Education, OR Ed. 357, Organization and Administration of Vocational Education	2
Ed. 231. Philosophy of Education, OR Ed. 233, Educational Sociology	2
Ed. 301. Introduction to Educational Research	2
Ed. 308. The Teaching of Arithmetic, OR Ed. 309, The Teaching of Reading	2
Ed. 326. Practice in the Supervision of Elementary-school Instruction	2
Ed. 335. The Elementary-school Curriculum, OR Ed. 336, The Secondary-school Curriculum	2
Ed. 339. Public-school Organization and Administration	2
Ed. 341. School Buildings and Equipment, OR Ed. 343, School Surveys, OR Ed. 344, Staff-personnel Administration OR Ed. 342, Public Education and the Law	2
Ed. 346. Principles of Supervision	2
Ed. 353. The Secondary-School Principal	2
Ed. 356. The Elementary-school Principal	2
<i>Other requirements</i>	6-12 Hr.
Option A—Thesis (Ed. 361), 4-6 hr.	4-6
Option B—Problem (Ed. 360), 3 hr., Elective, 3 hr. to be chosen with the adviser's approval	6
Option C—Electives, at least 10 hr. in academic fields, to be chosen with the adviser's approval	12
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

NOTE: Any administrative certificate issued by the State Department of Education is called a Professional Administrative Certificate.

NOTE: For those who already hold a Master's Degree and who wish to qualify for the University's recommendation for a Superintendent's Certificate, the following courses (described above) will satisfy:

¹The State Department of Education of West Virginia requires at least 5 years of experience in teaching, administration, or supervision, or any combination thereof, aggregating five years. In addition, a health certificate is required. Since most of the courses listed above have prerequisites, the consent of the instructor must be obtained before enrolling.

<i>Required Courses</i>	18 Hr.
General Administration: Ed. 339, 340, 203 or 357, 341, or 342, or 343 or 344	4-8 Hr.
Elementary-school Administration: Ed. 326, 335,* 356	4 Hr.
Secondary-school Administration: Ed. 327, 336,* 346, 353	4 Hr.
Introduction to Educational Research: Ed. 301	2 Hr.

*Ed. 335 or 336 (not both) can be accepted.

CURRICULUM FOR HIGH SCHOOL PRINCIPALS²

Degree: Master of Arts

I. <i>Required Courses</i> *	20 Hr.
Ed. 231. Philosophy of Education	2
Ed. 271. Educational Statistical Methods	2
Ed. 301. Introduction to Educational Research	2
Ed. 336. The Secondary-school Curriculum	2
Ed. 339. Public School Organization and Administration	2
Ed. 346. Principles of Supervision	2
Ed. 348. Human Development and Behavior	3
Ed. 353. The Secondary-school Principal	2
Ed. 373. Basic Course in Principles and Practices of Guidance	3
II. <i>Field Requirement</i>	6 Hr.
Ed. 327. Practice Supervision in the Secondary School	2
Ed. 328. Practice Administration in the Secondary School	2
Ed. 338. Problems in the Secondary School (Research Project)	2
III. <i>Academic Courses</i>	10 Hr.
Academic courses are taken in two or more recognized secondary-school teaching fields. These courses are to be chosen with the adviser's approval and are to be of a nature which will better qualify the principal to perform his tasks of administration and supervision in a school situation.	
TOTAL FOR MASTER'S DEGREE	36 Hr.

*Required course credits are to be given for seminar work as may be approved by the faculty adviser.

CURRICULUM FOR HIGH SCHOOL PRINCIPALS³

Degree: Master of Arts

I. <i>Required Courses</i>	14 Hr.
Ed. 271. Educational Statistical Methods	2
Ed. 301. Introduction to Educational Research	2

²Completion of this curriculum fulfills requirements for NCATE certification of secondary-school principals in West Virginia. This curriculum can be pursued only after arrangement with the faculty adviser. Other requirements for certification are: (1) graduation from an accredited college or university and qualifications for a Professional Certificate, valid in Grades 7-12; (2) three years of secondary-school teaching experience in Grades 7-12 (not in a one-teacher school); and (3) a health certificate.

³Completion of this curriculum also meets the present requirements for certification in West Virginia as a high-school principal but does not meet NCATE requirements. Other requirements for the high-school principal's certificate are: (1) graduation from an accredited college or university and qualifications for a Professional Certificate, valid in Grades 7-12; (2) three years of secondary-school teaching experience in Grades 7-12 (not in a one-teacher school), and (3) a health certificate. Since most of the courses in this curriculum have prerequisites, the consent of the instructors must be obtained prior to enrollment.

Those already holding a Master's Degree, who desire to qualify for this certificate, will be required to have the 14 hours listed in Section I and 6 hours from Section II to be recommended for a certificate.

Ed. 327. Practice Supervision of Secondary-school Instruction (take late)	2
Ed. 336. The Secondary-school Curriculum	2
Ed. 339. Public-school Organization and Administration (take early)	2
Ed. 346. Principles of Supervision (take early)	2
Ed. 353. The Secondary-school Principal (take late)	2
II. <i>Cognates</i>	6-8 Hr.
Ed. 231. Philosophy of Education	2
Ed. 259. The Music Education Program	2
Ed. 284. Pupil-personnel Administration, OR Ed. 348, Human Development and Behavior, OR Ed. 373, Basic Course in Principles and Practices of Guidance	2-3
Ed. 322. Organizing Programs of Audio-visual Instruction	2
Ed. 357. Organization of Programs in Vocational Education	2
Ed. 360. Problem in Education, OR Ed. 361, Thesis in Education	3-6
Phys. Ed. 278. Administration of Physical Education, OR Phys. Ed. 378, Problems in Physical Education, Health, and Recreation, OR Phys. Ed. 390, The Role of the School Administrator in Conducting Programs in Health, Physical Education, and Recreation	3
Social Work 221. The Field of Social Work, OR Soc. Wk. 260, Problems of Child Welfare, OR Soc. Wk. 285, Introduction to Public Welfare	3
III. <i>Academic</i>	10-14 Hr.
Academic courses in two or more recognized secondary-school teaching fields. These courses are to be chosen with the adviser's approval and are to be of a nature which will better qualify the principal to supervise the classroom instruction offered in modern secondary schools.	
IV. <i>Free Electives</i>	0-6 Hr.
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

CURRICULUM FOR ELEMENTARY SCHOOL PRINCIPALS⁴

Degree: Master of Arts

I. <i>Required Courses in Education</i> *	20 Hr.
Ed. 231. Philosophy of Education	2
Ed. 301. Introduction to Educational Research	2
Ed. 306. Social Studies in the Elementary School OR	
Ed. 307. Science in the Elementary School	2
Ed. 308. The Teaching of Arithmetic	2
Ed. 309. The Teaching of Reading	2
Ed. 313. Guidance in the Elementary School	2
Ed. 335. The Elementary-school Curriculum	2
Ed. 339. Public-school Organization and Administration	2
Ed. 346. Principles of Supervision	2
Ed. 356. The Elementary-school Principal	2

*Required course credits are to be given for seminar work as may be approved by the faculty adviser.

⁴Completion of this curriculum fulfills requirements for NCATE certification of elementary-school principals in West Virginia. This certificate can be pursued only after arrangement with the faculty adviser. Other requirements for certification are: (1) graduation from an accredited college or university and qualifications for a Professional Certificate, valid in Grades 1-9; (2) three years of teaching experience, grades 1-8; and (3) a health certificate. All electives, whether Education or academic, must have the adviser's approval. An approved list will be provided by the adviser upon request.

II. <i>Field Requirement</i>	6 Hr.
Ed. 314. Problems in Elementary Education (Research Project)	2
Ed. 325. Practice in Elementary-school Administration	2
Ed. 326. Practice in Elementary-school Supervision	2
III. <i>Approved Academic Courses</i>	10 Hr.
Academic courses are to be chosen with the adviser's approval, and are to be of a nature which will be of the most worth to the individual student.	
TOTAL FOR MASTER'S DEGREE	36 Hr.

CURRICULUM FOR ELEMENTARY SCHOOL PRINCIPALS⁵

Degree: Master of Arts

I. <i>Required Courses in Education</i>	18 Hr.
Ed. 301. Introduction to Educational Research (take early)	2
Ed. 306. Social Studies in the Elementary School, OR Ed. 307, Science in the Elementary School	2
Ed. 308. The Teaching of Arithmetic	2
Ed. 309. The Teaching of Reading	2
Ed. 326. Practice in the Supervision of Elementary-school Instruction (take late)	2
Ed. 335. The Elementary-school Curriculum (take early)	2
Ed. 339. Public-school Organization and Administration (take early)	2
Ed. 346. Principles of Supervision (take early)	2
Ed. 356. The Elementary-school Principal (take late)	2
II. <i>Approved Electives in Education (See Options A, B, or C)</i>	
Ed. 221. Audio-visual Resources for Instruction	2
Ed. 231. Philosophy of Education	2
Ed. 233. Educational Sociology	2
Ed. 284. Pupil-personnel Administration	2
Ed. 302. Primary-Kindergarten Education	2
Ed. 304. Corrective Techniques in Reading Instruction	2
Ed. 305. Problems in Reading Instruction	2
Ed. 312. Evaluation of Pupil Progress	2
Ed. 313. Elementary-school Guidance	2
Ed. 315. Current Practices in Elementary Education	2
Ed. 348. Human Development and Behavior	3
Ed. 366. Teaching the Language Arts	2
III. <i>Options</i>	12-18 Hr.
Option A: Thesis, 6 hr.; Electives, 6 hr.	12
OR	
Option B: Problem, 3 hr.; Electives, 9 hr.*	12
OR	
Option C: Academic, 10 hr. minimum; Electives, 8 hr.*	18
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

*Four hours of these electives shall be selected from Group II.

⁵Completion of this curriculum also meets the present requirements for certification in West Virginia as an elementary-school principal but does not meet NCATE requirements. Other requirements for the elementary-school principal's certificate are: (1) graduation from an accredited college or university and qualifications for Professional Certificate, valid in Grades 1-9; (2) three years of elementary-school teaching experience in Grades 1-8; and (3) a health certificate. Since most of the courses in this curriculum have prerequisites, the consent of the instructors must be obtained prior to enrollment. All electives, whether Education or academic, must have the adviser's approval. An approved list will be provided by the adviser upon request.

CURRICULUM FOR GENERAL SUPERVISORS⁴

Degree: Master of Arts

<i>Area I. General Requirements</i>	9 Hr.
Ed. 301. Introduction to Educational Research	2
Ed. 339. Public-school Organization and Administration	2
Ed. 346. Principles of Supervision	2
Ed. 348. Human Development and Behavior	3
<i>Area II. Field Experiences</i>	8 Hr.
Ed. 380. Practice in Supervision	2
Ed. 381. Practice in Supervision	2
Ed. 382. Practice in Supervision	2
Ed. 383. Practice in Supervision	2
<i>Area III. Requirements in Problems of Teaching</i>	8 Hr.
Ed. 306. Social Studies in the Elementary School, (2 hr.), OR Ed. 367. Teaching the Social Studies in Secondary Schools, (2 hr.)	2
Ed. 307. Science in the Elementary School	2
Ed. 308. The Teaching of Arithmetic	2
Ed. 366. Teaching the Language Arts	2
<i>Area IV. Recommended Electives (Non-Education)</i>	10-11 Hr.
Art 220	
English 220 (communications), 221, 228, 242, 243	
Psychology 211, 244	
Speech 233, 250, 251, 275	
Physical Education 203	
Political Science 200, 231	
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

CURRICULUM FOR SPECIAL SUPERVISORS⁵

Degree: Master of Arts

I. and II. Same as for General Supervisors	17 Hr.
III. Requirements in Special and Related Fields	19 Hr.
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

CURRICULUM FOR GENERAL SUPERVISORS⁵

Degree: Master of Arts

<i>Area I. General Requirements</i>	9 Hr.
Ed. 301. Introduction to Educational Research	2
Ed. 339. Public-school Organization and Administration	2
Ed. 346. Principles of Supervision	2
Ed. 348. Human Development and Behavior	3

⁴Program required for certification of general supervisors in West Virginia. This curriculum can be pursued only after arrangement with the faculty adviser.

⁵Program required for certification of special supervisors in West Virginia. Courses in special and related fields are selected to meet the needs of the supervisor in training and must be approved by the faculty adviser.

⁶This program does not qualify for a certificate in West Virginia. This curriculum can be pursued only after arrangement with the faculty adviser.

<i>Area II. Requirements in Problems of Teaching</i>	8 Hr.
Ed. 306. Social Studies in the Elementary School (2 hr.), OR Ed. 367, Teaching the Social Studies in Secondary Schools (2 hr.)	2
Ed. 307. Science in the Elementary School	2
Ed. 308. The Teaching of Arithmetic	2
Ed. 366. Teaching the Language Arts	2
<i>Area III. Approved Electives in Education</i>	8 Hr.
<i>Area IV. Recommended Electives (Non-Education)</i>	10-11 Hr.
Art 222	
English 220 (Communication), 228, 242, 243	
Psychology 205, 218, 222, 224	
Sociology 211, 244	
Speech 233, 250, 251, 275	
Physical Education 209, 378	
Health Education 203	
Political Science 200, 231	
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

CURRICULUM FOR SUPERVISORS⁹

Degree: Master of Arts

I. Same as for General Supervisors	9 Hr.
II. Approved Electives in Education	3-8 Hr.
III. Requirements in Special and Related Fields	19-24 Hr.
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

CURRICULUM FOR COUNSELORS¹⁰

Degree: Master of Arts

I. Required Courses	18 Hr.
Ed. 301. Introduction to Educational Research	2
Ed. 373.* Basic Course in Principles and Practices of Guidance	2
Ed. 374.* Occupational Information Techniques	2
Ed. 375.* Individual Inventory Techniques	2
Ed. 376.* Counseling Techniques	2
Ed. 377.* Special Counseling Problems	3
Ed. 378. Advanced Studies of Human Adjustment	2
Ed. 379. Organization and Administration of Guidance Services	2

*Completion of 12 semester hours alone as indicated by starred courses will contribute to endorsement as a teacher-counselor. Other requirements for certification as a teacher-counselor are possession of a Professional Certificate and 2 years' teaching experience at the level at which guidance is to be done.

If a Master's Degree has been earned in some other field, certification as a counselor may be procured by having 25 semester hours' credit, 18 in the required list and 7 from the electives.

***This program does not qualify for a certificate in West Virginia.** Courses in special and related fields are selected to meet the needs of the student and must be approved by the faculty adviser.

*Completion of this curriculum also fulfills the scholastic requirements in West Virginia for a Counselor's Certificate. Other requirements are: (1) a Professional Certificate at the level at which the guidance is to be done; (2) 2 years of successful teaching experience at the level at which the guidance is to be done; (3) a health certificate.

II. <i>Approved Electives</i>	6-12 Hr.
Psychology 205, 218, 222, 233, 236, 238, 310, 311, 350, 351	
Social Work 212, 221, 260, 301, 315	
Education 271, 304, 308, 309, 324, 346, 360, 361	
Sociology 210, 211, 233, 244	
Speech 275	
III. <i>Free Electives</i>	0-6 Hr.
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

CURRICULUM FOR SECONDARY-SCHOOL CLASSROOM TEACHERS¹¹

Degree: Master of Arts

I. <i>Graduate Courses in Education</i>	12-18 Hr.
A. Required Courses in Education	5 Hr.
Ed. 336. The Secondary-school Curriculum (take early)	2
Ed. 373. Basic Course in Principles and Practices of Guidance	3
B. Cognates in Education	5 Hr.(min.)
Ed. 221. Audio-visual Resources for Instruction	2
Ed. 259. The Music Education Program	2
Ed. 262. Vocational Home Economics in the Secondary School	2
Ed. 284. Pupil-personnel Administration	2
Ed. 285. The Junior High School	2
Ed. 309. The Teaching of Reading	2
Ed. 339. Public-school Organization and Administration	2
Ed. 346. Principles of Supervision	2
Ed. 348. Human Development and Behavior	3
Ed. 364. Advanced Methods in Teaching Industrial Arts	2
Ed. 366. Teaching the Language Arts	2
Ed. 367. Teaching the Social Studies in Secondary Schools	2
Ed. 370. Principles of Instruction	2
C. Other Phases of Education	2-10 Hr.
Ed. 203. Organization and Administration of Adult Education	2
Ed. 222. Current Practices in Secondary Education	2
Ed. 231. Philosophy of Education	2
Ed. 233. Educational Sociology	2
Ed. 251. Production of Audio-visual Resources	2
Ed. 258. Education for Special Groups	2
Ed. 270. Special Problems or Workshops	1-4
Ed. 271. Educational Statistical Methods	2
Ed. 275. Developing the Core Program	2
Ed. 276. Teaching Young and Adult Farmer Classes	2
Ed. 291. Exploratory Reading	2
Ed. 301. Introduction to Educational Research	2
Ed. 318. Planning Programs and Courses for Vocational	
Agriculture Departments	2
Ed. 322. Organizing Programs of Audio-visual Instruction	2
Ed. 357. Organization and Administration of Vocational	
Education	2
Ed. 360. Problem in Education	3
Ed. 361. Thesis in Education	6
Ed. 375. Individual Inventory Techniques	2
Ed. 385. History of Education in the United States	2
Ed. 395-398. Practicum	1-4

¹¹This curriculum does not qualify for a certificate. All courses to be selected by the candidate subject to the approval of his adviser so as to fulfill the above requirements.

II. Graduate courses in one of the candidate's certified teaching fields	12-18 Hr.
III. Graduate courses in another of the candidate's certified teaching fields	6 Hr.(min.)
IV. Free electives	0-6 Hr.
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

NOTE: The candidate who has a teaching field in Commerce will select suitable courses to meet the course requirements in this certified teaching field.

CURRICULUM FOR SECONDARY-SCHOOL CLASSROOM TEACHERS OF MATHEMATICS AND SCIENCE¹²

Degree: Master of Arts

I. Graduate Courses in Education	12 Hr.(min.)
A. Required Courses in Education	5 Hr.
Ed. 336. The Secondary-school Curriculum (take early)	2
Ed. 373. Basic Course in Principles and Practices of Guidance (take early)	3
B. Cognates in Education	5 Hr.(min.)
Ed. 221. Audio-visual Resources for Instruction	2
Ed. 284. Pupil-personnel Administration	2
Ed. 285. The Junior High School	2
Ed. 339. Public-school Organization and Administration	2
Ed. 348. Human Development and Behavior	3
C. Other Phases of Education	2 Hr.(min.)
Ed. 222. Current Practices in Secondary Education	2
Ed. 271. Educational Statistical Methods	2
Ed. 301. Introduction to Educational Research	2
Ed. 360. Problem in Education	3
Ed. 361. Thesis in Education	6
Ed. 375. Individual Inventory Techniques	2
II. Graduate Courses in one of the candidate's certified teaching fields, selected from those listed in A, B, C below†	10-18 Hr.
III. Graduate Courses in another of the candidate's certified teaching fields	6 Hr.(min.)
A. Mathematics	
1. Recommended courses	
Math. 238. Geometry for Teachers	3
Math. 247. Theory of Numbers	3
Math. 248. History of Mathematics	3
Math. 261. Special Topics	3
2. Other Courses in Mathematics	
Math. 235. Foundations of Algebra and Analysis	3
Math. 234. Theory of Equations	3
Math. 246. Introduction to Algebraic Theories	3

†The student, with the consent of his adviser and the department chairman, may take other 200 or 300 series courses for which he is qualified.

¹²This curriculum does not qualify for a certificate. All courses to be selected by the candidate subject to the approval of his adviser and the department chairman so as to fulfill the above requirements.

B. Biological Science

1. Recommended courses

Biol. 204. Biology Workshop	3
<i>and one of the following combinations:</i>	
*Botany 244. Plant Communities	3
<i>and</i>	
*Zoology 222. Field Studies of Invertebrates	3
<i>OR</i>	
Biol. 205. Principles of Evolution	3
<i>and</i>	
Zoology 223. Field Studies of Vertebrates	3
<i>OR</i>	
Biol. 205. Principles of Evolution	3
<i>and</i>	
Biol. 207. History of Biology	3

2. Other courses in Biological Science

Bacteriology 241. Fundamental Bacteriology	4
Botany 204. Adv. Botany	4
Botany 227. Geographic Botany	3
Botany 266. Flora of West Virginia	3
Biol. 221. General Ecology	3
Biology 212. Biological Preparations	3
Zoology 231. Comparative Anatomy	5

C. Physical Science

1. Recommended courses

Chem. 211. Intermediate Inorganic Lecture	2
Chem. 212. Intermediate Inorganic Laboratory	2
Chem. 275. Workshop in Chemistry, Inorganic	2
Chem. 276. Modern Theories and Practices in Organic Chem.	2
Physics 213. Introductory Electronics	3
Physics 254. Outline of Modern Physics	3
Physics 255. Workshop for Physics Teachers	3
Physics 256. Workshop for Physics Teachers	3
Physics 257. Photography	3

2. Other courses in Physical Science

Chem. 233. Organic Chemistry	4 or 5
Chem. 238. Organic Chemistry	4 or 5
Chem. 260. Physical Chemistry	4 or 5
Chem. 261. Physical Chemistry	4 or 5
Geol. 202. Physical Geology Laboratory for Teachers	1
Geol. 270. Mineral Resources	3
Astron. 216.	3

TOTAL FOR MASTER'S DEGREE 30-36 Hr.

*Combinations offered at Terra Alta Biological Station. The Department of Biology strongly recommends these courses in field work as highly desirable for high-school teachers of biology.

CURRICULUM FOR INDUSTRIAL ARTS TEACHERS¹³

Degree: Master of Arts

I. Required Courses	10 Hr.
Ed. 222. Current Practices in Secondary Education	2
Ed. 336. The Secondary-school Curriculum	2

¹³This curriculum does not qualify for a certificate. All electives, whether Education or academic, must have the adviser's approval. An approved list will be provided by the adviser upon request.

Ed. 339. Public-school Organization and Administration	2
Ed. 357. Organization of Programs of Vocational Education	2
Ed. 364. Advanced Methods in Teaching Industrial Arts	2
Ed. 365. Curriculum Construction in Industrial Arts	2
Ed. 303. History of Industrial Education	2
Ed. 310. School Shop Planning	2
Ed. 311. School Shop Safety Problems	2
II. <i>Electives from this Group</i>	10 Hr.
Ed. 203. Adult Education	2
Ed. 221. Audio-visual Resources for Instruction	2
Ed. 223. Clinical Experience in Student Teaching	2
Ed. 233. Educational Sociology	2
Ed. 251. Production of Audio-visual Resources	2
Ed. 258. Education for Special Groups	2
Ed. 271. Educational Statistical Methods	2
Ed. 284. Pupil-personnel Administration	2
Ed. 285. The Junior High School	2
Ed. 301. Introduction to Educational Research	2
Ed. 319. Special Problems in Teaching General Shop	2
Ed. 320-321. Special Topics in Industrial Arts	2-3
Ed. 322. Organizing Programs of Audio-visual Education	2
Ed. 327. Demonstration and Practice in Supervision of Secondary-school Instruction	2
Ed. 341. School Buildings and Equipment	2
Ed. 344. Staff-personnel Administration	2
Ed. 348. Human Development and Behavior	3
Ed. 360. Problem in Education	3
Ed. 373. Basic Course in Principles and Practices of Guidance	3
Ed. 376. Occupational Information Techniques	2
Ed. 385. History of Education in the United States	2
Ed. 395-8. Practicum	3
Rec. 204. Recreation Hobbies	3
III. <i>Electives, Practical or Skilled</i>	10 Hr.
Ed. 204. Advanced Woodworking (I.A.)	3
Ed. 206. Industrial Experience (I.A.)	2-6
Ed. 208. Wood Finishing (I.A.)	2
Ed. 238. Industrial Arts Design (I.A.)	2
Ed. 240. Advanced Metal Work (I.A.)	2
Ed. 241. Jewelry (I.A.)	2
Ed. 242. Upholstering (I.A.)	2
Ed. 243. Advanced Ceramics (I.A.)	2
Ed. 244. Advanced Leatherwork (I.A.)	2
Ed. 245. Advanced Plastics (I.A.)	2
Ed. 246. Advanced Graphic Arts (I.A.)	2
Ed. 247. Auto Mechanics (I.A.)	2
Ed. 248. Advanced Electricity (I.A.)	2
Ed. 249. Sheet Metal (I.A.)	2
Ed. 270. Special Problems and Workshops (Ind. Arts)	1-4
Ed. 272. Internship in Industrial Arts	8
Ed. 320. Special Topics in Industrial Arts	2-3
Ed. 321. Special Topics in Industrial Arts	2-3
IV. <i>Free Electives</i>	0-6 Hr.
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

NOTE: The I.A. courses in the 200 series are open only to seniors and graduate students who possess the necessary prerequisites.

CURRICULUM FOR AUDIO-VISUAL EDUCATION¹⁴

Degree: Master of Arts

I. Graduate Courses in Education	20-26 Hr.
A. Basic Professional Courses such as the following:	10-15 Hr.
Ed. 301. Introduction to Educational Research	2
Ed. 339. Public-school Organization and Administration	2
Ed. 336. The Secondary-school Curriculum	2
Ed. 341. School Buildings and Equipment	2
Ed. 346. Principles of Supervision	2
Ed. 335. The Elementary-school Curriculum	2
Ed. 373. Basic Course in Principles and Practices of Guidance	3
B. Specialized Audio-visual Courses such as the Following:	10-16 Hr.
Ed. 221. Audio-visual Resources for Instruction	2
Ed. 251. Production of Audio-visual Resources	2
Ed. 298. Exploratory Media in Education	2
Ed. 322. Organizing Programs of Audio-visual Instruction	2
Ed. 351. Principles of Communication	2
Ed. 395-8. Practicum in Audio-visual Education	2-6
Ed. 360. Problem in Audio-visual Education	3
Ed. 361. Thesis in Audio-visual Education	6
II. Academic Courses	10-16 Hr.
Academic courses shall be selected in two or more recognized teaching fields other than those fields in which the teacher is certified. All courses shall be approved by the adviser.	
III. Free Electives	0-6 Hr.
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

NOTE: A minimum of one year of teaching experience is a prerequisite for admission to this program.

CURRICULUM FOR HOME-ECONOMICS EDUCATION¹⁵

Degree: Master of Science

I. Required graduate courses in Education	10-20 Hr.
II. Required graduate courses in Home Economics	10-20 Hr.
III. Required graduate courses in tributary fields	0-10 Hr.
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

CURRICULUM FOR JUNIOR HIGH-SCHOOL CLASSROOM TEACHERS¹⁶

Degree: Master of Arts

I. Graduate Courses in Education	12-20 Hr.
A. Required Courses in Education	9 Hr.
Ed. 285. The Junior High School	2
Ed. 309. The Teaching of Reading	2
Ed. 336. The Secondary-school Curriculum (take early)	2
Ed. 373. Basic Course in Principles and Practices of Guidance (take early)	3

¹⁴This curriculum does not qualify for a certificate. All electives, whether Education or academic, must have the adviser's approval. An approved list will be provided by the adviser upon request.

¹⁵This curriculum does not qualify for a certificate. All electives, whether Education or academic, must have the adviser's approval. An approved list will be provided by the adviser upon request.

¹⁶This curriculum does not qualify for a certificate. All electives, whether Education or academic, must have the adviser's approval. An approved elective will be provided by the adviser upon request.

B. Other Phases of Education 3 Hr.(min.)

Elected from the following:

Ed. 203. Organization and Administration of Adult Education	2
Ed. 221. Audio-visual Resources for Instruction	2
Ed. 222. Current Practices in Secondary Education	2
Ed. 231. Philosophy of Education	2
Ed. 233. Educational Sociology	2
Ed. 251. Production of Audio-visual Resources	2
Ed. 259. The Music Education Program	2
Ed. 262. Vocational Home Economics in Secondary Schools	3
Ed. 270. Special Problems and Workshops	1-4
Ed. 271. Educational Statistical Methods	2
Ed. 275. Developing the Core Program	2
Ed. 276. Teaching Young and Adult Farmer Classes	2
Ed. 277. Organizing and Directing Supervised Farming Programs	2
Ed. 284. Pupil-personnel Administration	2
Ed. 291. Exploratory Reading	2
Ed. 301. Introduction to Educational Research	2
Ed. 304. Corrective Techniques in Reading Instruction	2
Ed. 305. Problems in Reading Instruction	2
Ed. 307. Science in the Elementary School	2
Ed. 308. Teaching of Arithmetic	2
Ed. 312. Evaluation of Pupil Progress in the Elementary School	2
Ed. 318. Planning Programs and Courses for Vocational	
Ed. 322. Organizing Programs of Audio-visual Instruction	2
Ed. 348. Human Development and Behavior	3
Ed. 357. Organization and Administration of Vocational Education	2
Ed. 360. Problem in Education	1-3
Ed. 361. Thesis in Education	1-6
Ed. 364. Advanced Methods in Teaching Industrial Arts	2
Ed. 366. Teaching the Language Arts	2
Ed. 367. Teaching the Social Studies in Secondary Schools	2
Ed. 375. Individual Inventory Techniques	2

II. Graduate courses in one of the candidate's teaching fields 10-18 Hr.
fields 10-18 Hr.

III. Graduate courses in another of the candidate's certified teaching fields 6 Hr.(min.)

IV. Free Electives 0-6 Hr.

TOTAL FOR MASTER'S DEGREE 30-36 Hr.

NOTE: The candidate who has a teaching field in Commerce will select suitable courses to meet the course requirements in this certified teaching field.

CURRICULUM FOR ELEMENTARY-SCHOOL CLASSROOM TEACHERS¹⁷

Degree: Master of Arts

I. Required Courses in Education 12 Hr.

Ed. 306. Social Studies in the Elementary School	2
Ed. 307. Science in the Elementary School	2
Ed. 308. The Teaching of Arithmetic	2
Ed. 309. The Teaching of Reading (take early)	2
Ed. 312. Evaluation of Pupil Progress (take late)	2
Ed. 335. The Elementary-school Curriculum (take early)	2

¹⁷**This curriculum does not qualify for a certificate.** All electives, whether Education or academic, must have the adviser's approval. An approved list will be provided by the adviser **upon request.**

II. <i>Approved Electives in Elementary Education</i>	8 Hr.
Ed. 221. Audio-visual Resources for Education	2
Ed. 226. Advanced Student Teaching (Elementary)	3
Ed. 301. Introduction to Educational Research	2
Ed. 302. Primary-Kindergarten Education	2
Ed. 304. Corrective Techniques in Reading Instruction	2
Ed. 305. Problems in Reading Instruction	2
Ed. 313. Elementary-school Guidance	2
Ed. 315. Current Practices in Elementary Education	2
Ed. 348. Human Development and Behavior	3
Ed. 366. Teaching the Language Arts	2
Ed. 370. Principles of Instruction	2
III. <i>Options</i>	10-16 Hr.
Option A: Thesis, 6 hr.; Electives, 4 hr.	10
OR	
Option B: Problems, 3 hr.; Electives, 7 hr.	10
OR	
Option C: Academic, 10 hr. (min.); Electives, 6 hr.	16
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

CURRICULUM FOR CLASSROOM TEACHERS IN SPECIAL EDUCATION¹⁸

I. <i>Certification Area</i>	9 Hr. (min.)
Ed. 368. Nature and Needs of Exceptional Children	3
Ed. 369. Curriculum, Materials, and Methods for the Mentally Retarded	3
Ed. 371. Curriculum, Materials, and Methods for the Mentally Gifted	3
Psych. 233. Psychology of Exceptional Children	3
II. <i>Area of General Curriculum</i>	6 Hr. (min.)
Ed. 308. The Teaching of Arithmetic	2
Ed. 309. The Teaching of Reading	2
Ed. 335. The Elementary-school Curriculum	2
Ed. 336. The Secondary-school Curriculum	2
III. <i>Arts and Crafts</i>	4 Hr. (min.)
Ed. 250. (I.A.) Industrial Arts for Elementary Schools	2
Other courses are to be developed in home economics and art.	
IV. <i>Area of Psychology Background and Measurements</i>	11 Hr. (min.)
Ed. 324. Administration of Individual Intelligence Tests	4
Ed. 375. Individual Inventory Techniques	2
Ed. 376. Counseling Techniques	2
Psych. 218. Psychology of Personality	3
Psych. 229. Abnormal Psychology	3
Psych. 236. Psychology of Adjustment	3
V. <i>Approved Electives</i>	2 Hr. (min.)
Ed. 231. Philosophy of Education	2
Ed. 271. Statistical Methods in Education	2
Ed. 301. Introduction to Educational Research	2
Ed. 304. Corrective Techniques in Reading Instruction	2
Ed. 373. Basic Course in Principles and Practices of Guidance	3
VI. <i>Clinical Practice in a Classroom Situation</i>	4 Hr. (min.)
TOTAL FOR MASTER'S DEGREE	30-36 Hr.

¹⁸This curriculum does not qualify for a certificate. All electives, whether Education or academic, must have the adviser's approval. An approved list will be provided by the adviser upon request. Prerequisites for admission: (1) First-Class teaching certificate, (2) two years of teaching experience, and (3) a prescribed level of mental ability.

THE SIX-YEAR PROGRAM FOR SCHOOL ADMINISTRATORS

The Six-Year Program provides opportunity to develop and improve competencies in administration, broaden knowledge and background in the cultural disciplines, analyze problems, collect data, and reach decisions relating to problems of special interest to the individual during two years of graduate study. Persons completing the two years of graduate study will receive the Master of Arts Degree and the Certificate of Advanced Study in Education, provided all appropriate requirements of the Master of Arts program and the Certificate of Advanced Study in Education have been fulfilled in the combined two-year program.¹⁹

SPECIAL REGULATIONS

1. The first year of graduate study should conform in general to the requirements of the particular Master's Degree programs designed for the area in which the student is preparing.

2. The student must be within 30 semester hours of completion of the two-year program of graduate study, with a grade-point average of better than 3.0 as a prerequisite to admission to (the second year of graduate study) The Six-Year Program for School Administrators.

3. All requirements and regulations applicable to the Certificate of Advanced Study in Education will apply to The Six-Year Program for School Administrators with exceptions as made above. One semester of residence in full-time graduate study is required as a part of The Six-Year Program.

CERTIFICATE OF ADVANCED STUDY IN EDUCATION

The purpose of this distinct and terminal sixth-year program is to meet the needs of school and other closely-allied personnel who have specific professional problems which they wish to pursue beyond the Master's level. Such persons should consult the Dean of the College of Education.

PREREQUISITES TO ADMISSION TO THE PROGRAM

1. Fulfillment of general requirements for admission to the Graduate School of West Virginia University.
2. A Master's Degree in Education with a grade-point average of more than 3.0.
3. A minimum of three years of teaching or closely-related educational experience.
4. The applicant must be engaged in, or on official leave from, school or closely-allied educational employment.

REQUIREMENTS FOR ADMISSION TO CANDIDACY

1. Evidence through personal letter, personal interview, and examination of acceptable standards of written and oral communication, general proficiency, and good health.
2. Satisfactory completion in residence at West Virginia University of at least six semester hours of approved course work beyond the conferring of the Master's degree.

GRADUATE COMMITTEE

Upon admission to candidacy, the matriculant will be assigned a Graduate Committee of three, of which one may be from outside the faculty of the College of Education, and the chairman of which shall serve as Graduate Adviser. The Committee must approve and will have general oversight of the candidate's program, direct his research, administer his final examinations, and, when he has satisfied all requirements, recommend him to the Dean of the Graduate School for the certificate.

¹⁹Persons who have completed the Master of Arts Degree with a grade-point average of 3.0 or better may enter The Six-Year Program. Changes in the program, as seem appropriate to the faculty adviser, should be made to avoid useless repetition, and to meet needs where these seem apparent.

REQUIREMENTS FOR COMPLETION

The Program: A minimum of 30 approved semester hours in residence earned after the conferring of the Master's Degree, consisting of: (a) 18-24 semester hours of course work in Education and intimately related areas, of which a maximum of six semester hours earned in residence at another recognized graduate institution, may, if of suitable character, be allowed; and (b) 6-12 semester hours of research.

Special Requirements: Competence in techniques of statistical research; evidence of a functioning command of appropriate methods of investigation; and mastery of acceptable practices of manuscript preparation.

Research: The candidate must submit a report of a research project, approved by and pursued under the direction of his advisory committee, on a problem in the area of his major professional interest. The report shall show familiarity with previous knowledge of the general problem and with concurrent attacks upon it; embody a clear definition of the particular approach of the present investigation; employ valid methods of research; demonstrate the ability to create and evaluate new knowledge; present and interpret unequivocally the results of the candidate's individual investigation; and disclose his ability to apply his contribution to the solution of his professional problem.

Residence: Both the course and research requirements are to be satisfied through residence credit. Although portions of the research project may be prosecuted in the field, they will be closely supervised through periodic field and campus conferences between the candidate and his committee.

Final Examination(s): If the candidate's research report is accepted and he has satisfied all other requirements, he will be admitted to final oral examination by his graduate committee which may also require a written examination. The examination(s) will probe the candidate's grasp of his field of specialization and cognate fields, and his ability to focus the results of his research upon the solution of his professional problem.

Time Limitation: All requirements shall, without exception, be completed within the seven calendar years immediately preceding the awarding of the Certificate.

THE DEGREE OF DOCTOR OF EDUCATION

The College of Education offers the degree of Doctor of Education in administration, supervision, curriculum, guidance and counseling, and classroom teaching. In cooperation with the School of Music, the School of Physical and Health Education, Recreation, and Safety, and Department of Speech (College of Arts and Sciences), the doctorate is offered in music education, physical education, health education, safety education, and speech education.

ADMISSION INTO THE DOCTORAL PROGRAM OF THE COLLEGE OF EDUCATION

Applicants expressing a desire to pursue a program leading to the Doctor of Education Degree are required to satisfy a College of Education faculty Committee on Prerequisites in the following ways:

A. Furnish evidence of three or more years of successful teaching and/or closely related experience.

B. Hold a Master's Degree or its equivalent with a grade-point average of 3.0 or higher.

C. Submit evidence of satisfactory performance on Graduate Record Examination.

D. Demonstrate by means of selected oral and written tests, ability to undertake a doctoral program of study and research.

E. Complete, in a satisfactory manner, if required, a trial period of resident study.

Doctoral Committee. When an applicant has received the permission of the Graduate School to enter upon an organized program of advanced graduate study and research, he will be assigned an adviser by the Dean of the College of Education. The Dean of the Graduate School and the adviser will jointly select a doctoral committee consisting of five or more members, of whom at least one shall be from

a field other than Education. For applicants of the cooperating schools, colleges, and departments, two of the five members shall be selected from the student's major discipline, one of whom shall serve as co-chairman. This committee will be appointed immediately following the successful completion of the screening examination.

The adviser shall serve as chairman of the doctoral committee, and this committee shall have charge and direction of the applicant's program. This program, prepared by the adviser and the applicant prior to the completion of twelve hours of resident course work beyond the Master's Degree, must be approved by the doctoral committee and by the Dean of the Graduate School.

Curriculum. The exact amount and nature of course work to be undertaken by a candidate will be determined in the light of his previous preparation and the demands of his chosen field of application. The aggregate of courses of graduate study shall be 70 or more semester hours, exclusive of the dissertation, of which a minimum of one-half of the semester hours in Education and one-third of the semester hours in cognate courses shall be on the 300 level. Not more than 12 of the 70 hours may be earned in extension and/or practicum or field work. The program of course work shall include a minimum of 24 semester hours in professional Education and a minimum of 24 semester hours in courses other than professional Education. These courses shall be so ordered and distributed as to promote broad and systematic knowledge and the ability to conduct independent research. Course work taken at another institution, if of suitable character and quality, may be accepted at the discretion of the Doctoral Committee.

Candidates having an earlier graduate degree or its equivalent from West Virginia University will be required to complete a prescribed number of resident graduate hours in one or more other institutions.

Qualifying Examination. After the applicant has spent at least one semester, or its equivalent, in full-time residence study beyond the successful completion of the screening examination, he will be eligible for the written and oral qualifying examinations, scheduled and conducted by the Chairman of the Graduate Committee, in the areas of general professional education, specialization, and cognates.

The applicant must: (a) show satisfactory knowledge of the important phases and problems of the field of major study and their application to other fields of human knowledge and accomplishment; (b) demonstrate the ability to employ rationally the appropriate instruments of research; and (c) present a written tentative outline of a proposed research project.

After successful completion of the written qualifying examination, the oral portion of the qualifying examination is scheduled within a reasonable time. If the committee is not satisfied with the applicant's performance, it will make specific recommendations for additional work in preparation for a second examination that may be undertaken not earlier than six months nor later than twelve months after the first trial. The outcome of the second attempt will be considered final.

When the applicant has passed the written and oral qualifying examinations, he will be admitted to candidacy for the Doctor of Education Degree. Admission to candidacy must precede the final examination by at least one academic year in time and 12 semester hours in credit. A maximum of 30 semester hours of graduate work pursued in fulfillment of the requirements for the Master's Degree or its equivalent, if of suitable character and quality, may be credited toward the doctorate.

Residence. In general, requirements for the Doctor of Education Degree contemplate three years of full-time graduate work beyond the Bachelor's Degree, including a minimum of two semesters in residence in full-time graduate study in West Virginia University beyond the Master's Degree or its equivalent.

Special Requirements. In addition to general curriculum requirements, candidates must demonstrate competence in the techniques of statistical research, evidence of a functioning command of appropriate methods of educational investigations, and mastery of the rules of manuscript preparation.

Dissertation. The candidate must submit a dissertation, pursued under the direction of his doctoral committee, on a problem in the field of his major interest. The dissertation must show familiarity with previous research in the general area of the problem; embody a clear definition of the particular problem pursued; employ valid methods of research; demonstrate the ability to create and evaluate new knowledge; present and interpret unequivocally the results of the candidate's individual investigation; and disclose his ability to apply his contribution to the solution of educational problems.

Final Examination. If the candidate's dissertation is approved and he has fulfilled all other requirements, he will be admitted to the final oral examination before his committee. At the option of his committee a written examination also may be required. The final examination or examinations shall be concerned with the dissertation, its contribution to knowledge, and the candidate's grasp of his field of specialization, and its relation to other fields. No candidate may proceed to his final examination until he has fulfilled residence requirements for the degree and until he has completed at least 12 semester hours of graduate study after admission to candidacy.

Time Limitation. Requirements for the Doctor of Education Degree must be completed within seven years after successful completion of the preliminary examination of the College of Education.*

COURSES OF INSTRUCTION**

202. PRIMARY-KINDERGARTEN EDUCATION. I, II, S. 2 hr. PR: Consent. Application of the principles of psychology to early childhood education.
Mr. Kennedy and Mrs. Cunningham
203. ORGANIZATION AND ADMINISTRATION OF ADULT EDUCATION. II. 2 hr. Mr. Allen
204. ADVANCED WOODWORKING, CONSTRUCTION, AND FINISHING. (I.A.). II, S. 3 hr. PR: Ed. 102 (I.A.), 103 (I.A.), or equiv. Selection of advanced projects, analysis of construction, planning, and finishing, application of machine tools.
Mr. Brennan
206. INDUSTRIAL EXPERIENCE. (I.A.). I, II, S. 2-6 hr. Open only to students qualifying to teach industrial arts or to become counselors. Evaluation of educative outcome of personal employment in industry as determined by duration, experience, records, study on job, and final examination. Counts as extension credit.
Mr. Brennan
208. WOOD FINISHING. (I.A.). I, S. 2 hr. PR: Ed. 103 (I.A.), 204 (I.A.). Practice and theory in the art of sanding, scraping, filling, dyeing, staining, waxing, and other natural and synthetic treatments to the surface of wooden articles constructed in the industrial arts shop.
Mr. Brennan
212. EVALUATION OF PUPIL PROGRESS IN THE SECONDARY SCHOOLS. I, II, S. 2 hr. PR: Consent. Practical techniques for evaluating pupil progress and teaching effectiveness.
Staff
219. ADULT EDUCATION IN HOMEMAKING. I, II. 2 hr. PR: 30 hr. of home economics and 7 hr. of Education. Current trends and present activities in the field of adult education. Organization of adult classes, development of unit outlines; consideration of teaching methods; illustrative material, and bibliography for use in adult classes.
Staff
221. AUDIO-VISUAL RESOURCES FOR INSTRUCTION. I, II. 2 hr. Multisensory techniques in using wide varieties of materials and resources in teaching. One laboratory period per week, time to be arranged. Mr. Allen and Mr. Gunselman
222. CURRENT PRACTICES IN SECONDARY EDUCATION. I, II, S. 2 hr. Staff
223. CLINICAL EXPERIENCE IN STUDENT TEACHING. I, II, S. 2 hr. PR: Ed. 124 or equiv., permission of Director of Secondary Student Teaching. This is an advanced course in student teaching, stressing clinical procedures in classroom learning problems, industrial arts therapy, and other related areas.
Mr. Miller and Staff
226. ADVANCED STUDENT TEACHING (ELEMENTARY). I, II, S. 3 hr. PR: 3 hr. of student teaching or equiv., permission of the Director of Elementary Student Teaching. Emphasizes types of experiences not generally included in beginning student teaching.
Mr. McLaughlin and Staff

*Effective September, 1963.

**To receive graduate credit for courses numbered 200-299, the student must have had at least 17 hours in undergraduate Education.

231. PHILOSOPHY OF EDUCATION. II, S. 2 hr. PR: 5 hr. of Ed. courses, senior standing. Evaluation of educational theories and practices in terms of the several judgments of ultimate worth set up by man in his endeavor to understand life's real meaning. Mr. Bell
233. EDUCATIONAL SOCIOLOGY. S. 2 hr. PR: 5 hr. in Ed. courses, senior standing. Impacts of institutions of society upon school, and school's counter-impact upon social institutions and agencies. Mr. Bell
238. INDUSTRIAL ARTS DESIGN. (I.A.). I, S. 2 hr. PR: Consent. Fundamentals of design, characteristics of period and modern furniture, and construction details. Mr. Madia
- 240-250. These courses are designed to prepare versatile teachers of industrial arts and to meet state certification requirements. The abbreviated introduction to specific crafts through these courses is intended to provide broad rather than specialized experience and to prepare the teacher to teach the fundamentals of crafts rather than to attain vocational competence. Prospective teachers should elect, from these courses, those which will supplement their previous training in organizing and directing the industrial arts program.
240. ADVANCED METAL WORKING. (I.A.). I, S. 2 hr. PR: Ed. 104 (I.A.). Design and construction using sheet, bar, and wire. Introduction to jewelry. Mr. Madia
241. JEWELRY. (I.A.). II, S. 2 hr. PR: Ed. 104 (I.A.). Design and construction of projects in costume jewelry made from gold-filled and silver wire and sheets; installing jewels; gold and silver soldering; tool design and tool making for special operations. Mr. Madia
242. UPHOLSTERING. (I.A.). S. 2 hr. PR: Ed. 103 (I.A.). Original and renewal installation of selected materials for springing, stuffing, and covering furniture; incidental reinforcement and repairs. Each student will need to purchase a sample kit of tools. Mr. Madia
243. ADVANCED CERAMICS. (I.A.). II, S. 2 hr. PR: Ed. 122 (I.A.). Concentration in ceramic manipulation, particularly on the potter's wheel; glaze experimentation. Mr. Brennan
244. ADVANCED LEATHER WORK. (I.A.). I, S. 2 hr. PR: Ed. 121 (I.A.). Advanced leather work techniques with emphasis on leather carving. Mr. Brennan
245. ADVANCED PLASTICS. (I.A.). II, S. 2 hr. PR: Ed. 121 (I.A.). Continued manipulation of plastic materials. Construction of dies, forms; internal carving. Mr. Brennan and Mr. Ault
246. ADVANCED GRAPHIC ARTS. (I.A.). II, S. 2 hr. PR: Ed. 180 (I.A.), 181 (I.A.) or equiv. Binding, silk-screen and off-set reproduction methods. Provision is made for concentration in one unit with opportunity for personal research in student's chosen area. Mr. Brennan
247. AUTO MECHANICS. (I.A.). S. 2 hr. Practice and theory in operation and maintenance of internal combustion engines. Staff
248. ADVANCED ELECTRICITY. (I.A.). II, S. 2 hr. PR: Ed. 131 (I.A.) or equiv. A study of the technical phases of electricity with emphasis on planning shop courses, shop equipment and layout, and development of instructional aids. Mr. Ault
249. SHEET METAL. (I.A.). II, S. 2 hr. Designing, making patterns, and construction of sheet metal objects useful about the modern home. Cutting, bending, forming, spinning, soldering, and similar operations. Mr. Ault
250. INDUSTRIAL ARTS FOR ELEMENTARY SCHOOLS. (I.A.). II, S. 2 hr. Particularly designed for elementary teachers. Planning units around activity areas and developing of manipulative operations to supplement these units. Work includes simple wood and metal operations, plastics, and crafts suitable for the elementary pupil. Mr. Madia

251. PRODUCTION OF AUDIO-VISUAL RESOURCES. I, S. 2 hr. PR: Ed. 221. Practical participation in planning and producing audio-visual media for use in teaching, for supporting the school's public relations program, and in educational research. Mr. Allen and Mr. Gunselman
259. THE MUSIC EDUCATION PROGRAM. S. 2 hr. PR or parallel: Ed. 124 or consent. Organization and administration of the complete music education program for grades one through twelve. Mr. Brown
262. VOCATIONAL HOME ECONOMICS IN SECONDARY SCHOOLS. I, II. 3 hr. PR or parallel: Ed. 120, 124, 163; 25 hr. in Home Econ. Primarily for seniors and teachers of home economics. Miss Noer
270. SPECIAL PROBLEMS AND WORKSHOPS. I, II, S. 1-4 hr. PR: 14 hr. in Education. To take care of credits for special workshops and short intensive unit courses on methods, supervision, and other special topics. Maximum of 8 sem. hr. may be applied toward the Master's Degree, of which no more than 6 sem. hr. shall be in extension. Staff
271. EDUCATIONAL STATISTICAL METHODS. I, II, S. 2 hr. PR: Senior or graduate standing. Elementary methods in educational statistics. Mr. Bailey
272. INTERNSHIP IN INDUSTRIAL ARTS THERAPY (I.A.). I, II, S. 8 hr. Designed for student internship in clinical setting to provide individualized instruction in the teaching technique in industrial arts and the therapeutic practice in rehabilitation of the handicapped. Mr. Brennan
274. WORKSHOP: ECONOMIC EDUCATION. S. 3 hr. A workshop for principals, teachers, and supervisors with emphasis on the economic structure of our society and methods of integrating economics into the school program. Sponsored jointly by the College of Education and the College of Commerce. Mr. Lee
275. DEVELOPING THE CORE PROGRAM. II, S. 2 hr. PR: May be taken with or following student teaching. Mr. Cook
276. TEACHING YOUNG AND ADULT FARMER CLASSES. I, S. 2 hr. PR: Ed. 105, 106. Participation in conducting young and adult farmer classes and school-community food preservation centers; organization, course of study, and methods of teaching and supervision, and young farmers' association. Mr. Butler
277. ORGANIZING AND DIRECTING SUPERVISED FARMING PROGRAMS. II, S. 2 hr. PR: Ed. 160 or consent. Planning programs of supervised farming, supervising and evaluating such programs for all-day students, young farmers, and adult farmers. Mr. Butler
284. PUPIL-PERSONNEL ADMINISTRATION. I, II, S. 2 hr. PR: Ed. 105, 106. Pupil accounting, guidance, extra-curricular activities, and control. Open only to senior students and graduates. Mr. Harrah
285. THE JUNIOR HIGH SCHOOL. I, II. 2 hr. PR: Ed. 105, 106, and consent. Development, philosophy, program, and practices of the junior high school. Open only to seniors and graduates. Mr. Harrah
291. EXPLORATORY READING. S. 2 hr. PR: Consent. For those who feel need for wider acquaintance with books. Mr. Kennedy
292. ADVANCED INSTRUCTION IN TYPEWRITING (B.E.). S. 2 hr. PR: Teacher Certification in Commerce. Psychological principles of motor skill applied to the teaching of keyboard, development of speed and accuracy; diagnostic and remedial treatment, motivation, production units, evaluation and grading; teaching of electric typewriter. Staff
293. ADVANCED INSTRUCTION IN SHORTHAND AND TRANSCRIPTION (B.E.). S. 2 hr. PR: Teacher Certification in Commerce. Techniques for developing reading and writing skills; patterns of dictation to achieve objectives; transcription practices and standards of mailability. Staff

294. SEMINAR IN BUSINESS EDUCATION (B.E.). S. 2 hr. PR: Teacher Certification in Commerce. Group and individual problems in business education. Staff
295. ADVANCED INSTRUCTION IN BOOKKEEPING (B.E.). S. 2 hr. PR: Teacher Certification in Commerce. Approaches to the teaching of bookkeeping, motivation and teaching devices, measurement and evaluation of students. Staff
296. ADVANCED INSTRUCTION IN OFFICE PRACTICE AND BUSINESS MACHINES (B.E.). S. 2 hr. PR: Teacher Certification in Commerce. Organization of office practice and machine classes, adjustment of course content to class and community needs, procedure for presenting subject matter, measurement and evaluation of student progress. Staff
297. PRINCIPLES OF BUSINESS EDUCATION (B.E.). S. 2 hr. PR: Teacher Certification in Commerce. Practices, trends, and current issues in business education; study of placement, follow-up, and work experience programs; guidance, measurement, and standards. Staff
298. EXPLORATORY MEDIA IN EDUCATION. I, II, S. 2 hr. PR: Upper-division or graduate standing. The use of newer media in teaching. Educational television, radio, and programmed learning will be given special emphasis. A minimum of one hour each week laboratory practice in observation and use of newer media is required. Mr. Gunselman
301. INTRODUCTION TO EDUCATIONAL RESEARCH. I, II, S. 2 hr. Required of all candidates for the administrative and supervisory programs and for Options A and B for the Master's Degree. Methods, techniques, interpretations, and reporting of research. Mr. Hofstetter and Mr. Bailey
303. HISTORY OF INDUSTRIAL EDUCATION. I, S. 2 hr. Development of hand work instruction in Europe and the United States. Particular emphasis is placed on modern practices in industrial education and its leaders, their viewpoints, and contributions. Mr. Brennan
304. CORRECTIVE TECHNIQUES IN READING INSTRUCTION. I, II, S. 2 hr. PR: Ed. 309 or consent. Methods and materials to help pupils with reading difficulties. Mr. Kennedy
305. PROBLEMS IN READING INSTRUCTION. I, II, S. 2 hr. PR: Ed. 304, 309. Individual and group research on selected problems in the teaching of reading. Mr. Kennedy
306. SOCIAL STUDIES IN THE ELEMENTARY SCHOOL. I, II, S. 2 hr. PR: 10 hr. undergraduate credit in elementary education, or consent. Survey course in the teaching of social studies. Mr. McLaughlin
307. SCIENCE IN THE ELEMENTARY SCHOOL. II, S. 2 hr. PR: 10 hr. of undergraduate credit in elementary education. Materials and methods of science with special consideration of human health and safety. Mr. Katz
308. THE TEACHING OF ARITHMETIC. I, S. 2 hr. PR: 10 hr. of undergraduate credit in elementary education, or consent. Processes of number thinking and sequential steps of their development among pupils. Mrs. Cunningham
309. THE TEACHING OF READING. I, II, S. 2 hr. PR: 10 hr. of undergraduate credit in elementary education, or consent. Survey course in the teaching of reading. Mr. Kennedy
310. SCHOOL SHOP PLANNING. I, S. 2 hr. A study of considerations affecting the selection, purchase, arrangement, installation and use of equipment for different levels and types of school shops. Each student prepares a scale model of a typical shop installation. Mr. Ault
311. SCHOOL SHOP SAFETY PROGRAMS. II, S. 2 hr. Emphasis on safety measures appropriate to schools and industry, teacher liability. Students prepare a written report on an approved topic. Mr. Ault
312. EVALUATION OF PUPIL PROGRESS IN THE ELEMENTARY SCHOOL. I, II, S. 2 hr. PR: Consent of Instr. Practical techniques for evaluating pupil progress and teaching effectiveness. Mr. Katz and Mr. McLaughlin

313. ELEMENTARY-SCHOOL GUIDANCE. I, II, S. 2 hr. PR: Consent. Practical application of the principles of guidance to the elementary school. Mr. Bell
315. CURRENT PRACTICES IN ELEMENTARY EDUCATION. I, II, S. 2 hr. PR: Consent. Critical analysis of modern techniques and practices in the elementary school. Mr. Katz and Mr. Bell
318. PLANNING PROGRAMS AND COURSES FOR VOCATIONAL AGRICULTURE DEPARTMENTS. I, S. 2 hr. PR: Ed. 124. Gathering data, studying the farming problems of all-day students, young farmers, and adult farmers, and planning the total program for the department. Mr. Butler
319. SPECIAL PROBLEMS IN TEACHING GENERAL SHOP. S. 3 hr. PR: Ed. 107 or equiv. Problems peculiar to teaching Industrial Arts in the General Shop. Mr. Ault
- 320, 321. SPECIAL TOPICS IN INDUSTRIAL ARTS. I, II, S. 2-3 hr. ea. PR: Consent. For graduate students in industrial arts. Special projects of improvement in phases needing special attention. Mr. Ault, Mr. Brennan, and Mr. Madia
322. ORGANIZING PROGRAMS OF AUDIO-VISUAL INSTRUCTION. I, S. 2 hr. PR: Ed. 221. An advanced course dealing with problems of planning extensive programs for using exhibits, slides, graphics, films, radio, television, etc., for instructional purposes. Mr. Allen and Mr. Gunselman
324. ADMINISTRATION OF INDIVIDUAL INTELLIGENCE TESTS. I, II, S. 4 hr. Techniques in administering, scoring, and interpreting individual mental ability tests. Mr. Jarecke and Mr. Wagner
325. PRACTICE ADMINISTRATION IN THE ELEMENTARY SCHOOL. I, II, 2 hr PR: Consent. The principal enrolled in on-the-job education is given help in school organization and administration according to the needs in his own school and school system. Mr. Bell
326. PRACTICE IN SUPERVISION OF ELEMENTARY-SCHOOL INSTRUCTION. S. 2 hr. PR: 6 graduate hr. of elementary education, or consent. Observing and practicing major activities of the supervisor in work with pupils and teachers. To be taken late in student's candidacy. Mr. Harrah and Mrs. Cunningham
327. DEMONSTRATION AND PRACTICE IN THE SUPERVISION OF SECONDARY-SCHOOL INSTRUCTION. II, S. 2 hr. PR: Consent. Opportunity to observe approved processes in classroom supervision, and to practice under guidance the art of improving classroom instruction. To be taken late in student's candidacy. Mr. Miller
328. PRACTICE ADMINISTRATION IN THE SECONDARY SCHOOL. I, II, 2 hr. PR: Consent. The principal enrolled in on-the-job education is given help in school organization and administration according to the needs in his own school and school system. Mr. Miller
335. THE ELEMENTARY-SCHOOL CURRICULUM. I, II, S. 2 hr. PR: 10 hr. of undergraduate credit in elementary education, or consent. Organization of content and materials of instruction of subjects through the grades. Mr. Katz
336. THE SECONDARY-SCHOOL CURRICULUM. I, II, S. 2 hr. PR: High-school teaching experience, or consent. Principles of and practice in curriculum construction for modern high schools. Mr. Cook
337. PROBLEMS IN SECONDARY-SCHOOL CURRICULUM. I, II, S. 2 hr. PR: 8 hr. graduate education, including Educ. 336. Critical study of selected problems in the secondary-school curriculum with special emphasis on research. Mr. Cook
338. PROBLEMS IN THE SECONDARY SCHOOL. I, II, 2 hr. PR: Consent. Culminating course for on-the-job education of principals. Requires the principal to work through and write a project designed to improve instruction and/or administration of his school. Mr. Hofstetter and Staff
339. PUBLIC-SCHOOL ORGANIZATION AND ADMINISTRATION. I, S. 2 hr. PR: 20 hr. of Ed. courses, and consent. An orientation course for present and prospective

school administrators, with emphasis upon the problems which grow out of the county unit. Required as a basic course of all who specialize in educational administration. Mr. Harrah

340. PUBLIC-SCHOOL FINANCE. S. 2 hr. PR or Conc: Ed. 339 and consent. Sources of school support; taxation; efficient management of school money, locally by improved budget practices and statewide by more adequate apportionment plans. To be taken late in student's candidacy. Mr. Harrah
341. SCHOOL BUILDINGS AND EQUIPMENT. I, S. 2 hr. PR or Conc: Ed. 339 and consent. Philosophy, planning, and management of school plant as appropriate physical environment—the home of pupils for more efficient learning. Mr. Harrah
342. PUBLIC EDUCATION AND THE LAW. I, II, S. 2 hr. Legal permissives and limitations involved in setting policy for, organization of, and administration of public schools. Mr. Morris
343. SCHOOL SURVEYS. S. 2 hr. PR or conc: Ed. 339 and consent. Development of the educational survey as an instrument for improving educational procedures. Mr. Harrah
344. STAFF-PERSONNEL ADMINISTRATION. S. 2 hr. PR or Conc: Ed. 339, consent. Selection, induction, direction, evaluation, improvement, and promotion of members of the supervisory, instructional, research, clerical, and maintenance staffs. Mr. Harrah
345. SEMINAR IN SCHOOL ADMINISTRATION. I, II, S. 6-8 hr. PR: Consent. An integrated study of the problems of the school administrator in the areas of finance, buildings and equipment, school law, school surveys, staff personnel, organization and administration. Mr. Hofstetter and Staff
346. PRINCIPLES OF SUPERVISION. I, S. 2 hr. Basic, general principles of elementary-school, junior high-school, and senior high-school supervision. Mr. Harrah
348. HUMAN DEVELOPMENT AND BEHAVIOR. I, II, S. 3 hr. A study of the inter-relationship of physical and environmental factors as they affect the behavior of children and youth. Mr. Taylor and Mr. Katz
350. INTER-DISCIPLINARY SEMINAR FOR SCHOOL ADMINISTRATORS. I, II. 6 hr. PR: Consent. A study of the academic disciplines pertinent to school administration. Mr. Harrah
351. PRINCIPLES OF COMMUNICATION. I, II, S. 2 hr. Critical review of psychological implications of communication media in learning and teaching. Mr. Allen
353. THE SECONDARY-SCHOOL PRINCIPAL. II, S. 2 hr. PR: Ed. 339 and high-school teaching experience, or consent. Open only to graduate students in Education, late in candidacy. Practicum in secondary-school administration. Mr. Miller
356. THE ELEMENTARY-SCHOOL PRINCIPAL. S. 2 hr. PR: 6 graduate hr. of elementary education, or consent. Work of principal in management and supervision of school. To be taken late in candidacy. Mr. Bell
357. ORGANIZATION AND ADMINISTRATION OF VOCATIONAL EDUCATION. S. 2 hr. PR: Ed. 339. Specific consideration of the development of practical training in agriculture, home economics, industry, and commerce, with particular reference to their place in the public-school system. Mr. Allen
360. PROBLEM IN EDUCATION. I, II. S. 1-3 hr. Total minimum, 3 hr. Research for Master's Degree in Education, option B. Staff
361. THESIS IN EDUCATION. I, II, S. 1-6 hr. Total minimum, 6 hr. Research for Master's Degree in Education, option A. Staff
362. PROJECT IN EDUCATION. I, II, S. 1-6 hr. Total minimum, 6 hr. Research for the program leading to the Certificate of Advanced Study in Education. Staff
363. DISSERTATION. I, II, S. Research for the Doctor of Education Degree. Staff

364. ADVANCED METHODS IN TEACHING INDUSTRIAL ARTS. II, S. 2 hr. PR: Ed. 194. Industrial arts development; effective use of instructional materials; methods of evaluating industrial arts subjects. Mr. Brennan
365. CURRICULUM CONSTRUCTION IN INDUSTRIAL ARTS. S. 3 hr. PR: Consent. Techniques used in building a curriculum in industrial arts. Mr. Ault
366. TEACHING THE LANGUAGE ARTS. I, II, S. 2 hr. PR: Consent. Advanced study of the interrelationships of the language arts. Mr. Kennedy
367. TEACHING THE SOCIAL STUDIES IN SECONDARY SCHOOLS. I, II, S. 2 hr. PR: Consent. Survey course in teaching the social studies. Mr. Cook
368. NATURE AND NEEDS OF EXCEPTIONAL CHILDREN. I, II, S. 3 hr. Etiology, philosophy, and education of mentally retarded, physically handicapped, and mentally advanced. Mr. Neff
369. CURRICULUM, MATERIALS, AND METHODS FOR MENTALLY RETARDED. I, II, S. 3 hr. Mr. Neff
370. PRINCIPLES OF INSTRUCTION. I, II, S. 2 hr. The application of philosophical and psychological foundations of instruction. Mr. Cook
371. CURRICULUM, MATERIALS, AND METHODS FOR MENTALLY GIFTED. I, II, S. 3 hr. Mr. Neff and Mr. Taylor
372. STATISTICAL ANALYSIS IN EDUCATION. I, II, S. 2 hr. PR: Ed. 271 or consent. Statistical analysis and inference. Mr. Hofstetter and Mr. Bailey
373. BASIC COURSE IN PRINCIPLES AND PRACTICES OF GUIDANCE. I, II, S. 3 hr. An overview of a total guidance program. Mr. Jarecke and Mr. Wagner
374. OCCUPATIONAL INFORMATION TECHNIQUES. II, S. 2 hr. PR: Ed. 373. Methods of gathering and disseminating occupational and educational information. Mr. Jarecke and Mr. Wagner
375. INDIVIDUAL INVENTORY TECHNIQUES. II, S. 2 hr. PR: Ed. 373. Comprehensive study of all objective measures used in schools; techniques of administration, interpreting and recording results. Mr. Jarecke and Mr. Wagner
376. COUNSELING TECHNIQUES. I, II, S. 2 hr. PR: Ed. 373, 374, 375. Study of and practices in techniques of counseling. Mr. Jarecke and Mr. Wagner
377. SPECIAL COUNSELING PROBLEMS. I, II, S. 3 hr. PR: Ed. 373, 374, 375, 376. Work with actual problem cases according to clinical procedures. Cases to be pursued to satisfactory conclusion. Mr. Jarecke and Mr. Wagner
378. ADVANCED STUDIES OF HUMAN ADJUSTMENT. II, S. 2 hr. PR: Ed. 373, 374, 375, 376. Analytical consideration of identification, causes, and development of psychological maladjustments; further study of developments in counseling and background in advance studies in guidance. Mr. Jarecke and Mr. Taylor
379. ORGANIZATION AND ADMINISTRATION OF GUIDANCE SERVICES. II, S. 2 hr. PR: Ed. 373, 374, 375, 376. Operative framework of guidance programs in terms of personnel, functions, relationships, physical facilities, instructional integration, finance standards, law and regulations. Mr. Jarecke
- 380, 381, 382, 383. PRACTICE IN SUPERVISION. I, II. Credit: 2 hr. ea. PR: Assignment to actual full-time work in supervision in a school system, previous certification, and consent. Each course a continuation of the preceeding. To complete the entire 8 hours, not less than two full years of field experience under control of Director of Supervised Training will be accepted. Mr. Harrah
385. HISTORY OF EDUCATION IN THE UNITED STATES. I, II, S. 2 hr. Origins, development, and significance of educational movements. Mr. Bell
- 395, 396, 397, 398. PRACTICUM. I, II, S. 1-4 hr. per sem. or term—aggregating not more than 12 hr. PR: 8 graduate hr. in Education. Enrollment with per-

mission of adviser or instructor in consultation. Special individual and group projects. To provide appropriate credits for special workshops, prolonged systematic conferences on problems and projects in Education. Credits in these projects cannot be substituted for required courses and must be done in residence. Staff

Agricultural Education: Mr. Butler.

Audio-visual Education: Mr. Allen and Mr. Gunselman.

Educational Measurement and Evaluation: Mr. Bailey.

Educational Psychology: Mr. Taylor.

Educational Sociology: Mr. Cook.

Guidance: Mr. Jarecke and Mr. Wagner.

Elementary Education: Mr. Katz, Mr. Kennedy, Mr. Bell, and Mrs. Cunningham.

Home Economics Education: Miss Brown and Miss Noer.

Human Growth and Development: Mr. Taylor.

Industrial Arts Education: Mr. Ault and Mr. Brennan.

Music Education: Mr. Brown.

Philosophy of Education: Mr. Bell.

School Administration: Mr. Harrah, Mr. Bell, and Mr. Miller.

Secondary Education: Mr. Cook, Mr. Bailey, and Mr. Gunselman.

Special and Adult Education: Mr. Allen and Mr. Neff.

Supervision: Mr. Hofstetter and Mr. Harrah.

Teaching of Mathematics: Mrs. Cunningham and Mrs. Dorsey.

Teaching of Science: Mr. Katz.

Teaching of Social Studies: Mr. Cook.

Vocational Education: Miss Brown, Miss Noer, Mr. Allen, and Mr. Butler.

399. TECHNIQUES OF EDUCATIONAL RESEARCH. II. 2 hr. PR: Ed. 271 and consent. Application of research techniques to problems in modern education; analysis and implications of results. Mr. Hofstetter

ENGINEERING

GENERAL REQUIREMENTS

REQUIREMENTS FOR ADMISSION

A student desiring to take courses for graduate credit in the College of Engineering must first comply with the appropriate regulations of the Graduate School.

After having been admitted to the Graduate School, a student who intends to become a candidate for a degree must apply for admission to the major department of his choice. Acceptance by the major department will depend upon review of the student's academic background and the available facilities in the department.

An applicant with a baccalaureate degree, or its equivalent, from a department accredited by the Engineers' Council for Professional Development will be admitted on the same basis as engineering graduates of West Virginia University. Lacking these qualifications, an applicant must first fulfill the requirements of the department in which he is seeking an advanced degree.

Admission to candidacy for a graduate degree is required prior to obtaining that degree. A graduate student may apply for admission to candidacy by formal application after completing a minimum of 12 semester hours of graduate courses with a grade-point average of at least 3.0, based on all graduate courses, taken in residence, for which he has received a grade at the time of application.

ACADEMIC STANDARDS

No credits are acceptable toward an advanced degree which are reported with a grade lower than C.

To qualify for an advanced degree, the graduate student must have a grade-point average of at least 3.0 based on all graduate courses for which he has received a grade from the University.

CURRICULA

Each candidate for a degree must select his major subject in that department in which his degree is taken:

Ph.D. Degree—See departmental descriptions.

M.S. Degree—Each department has a designated M.S. Degree and in addition the College has an undesignated degree, Master of Science in Engineering. For all M.S. Degrees each candidate will, with the approval of his graduate committee, follow a planned program which must conform to one of the following outlines:

1. A minimum of 30 semester credit hours, not more than 6 of which are in research leading to an acceptable thesis.
2. A minimum of 33 semester credit hours, not more than 3 of which are in research leading to an acceptable problem report.
3. A minimum of 36 semester credit hours, with no thesis or problem report required.

At least one-half of the courses taken, exclusive of research, must be in the College of Engineering with as many as possible at the 300 level.

A graduate student in the College of Engineering must comply with the regulations of his major department.

MASTER OF SCIENCE IN ENGINEERING

This degree program is designed for students who desire to pursue work in an area other than that of their baccalaureate degree. Graduate students who wish to become candidates for this degree should register with the department in which the major portion of the work is to be done.

Admission and Academic Standards. Students must comply with the rules and regulations as outlined under Requirements for Admission and Academic Standards for graduate work in the College of Engineering.

Adviser and Examining Committee. Each student will be assigned an adviser and an advisory and examining committee will be appointed by the department in which the major portion of the work is to be done.

Final Examination. On completion of the course requirements a candidate for the degree of Master of Science in Engineering shall be required to pass a final examination which may be written, or oral, or both, covering both course material and the thesis or problem report, depending upon the option selected.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Admission. Admission to the Graduate School of West Virginia University is required of all applicants for admission to a program of study and research leading to the Ph.D. in Engineering. Applicants for admission are expected to have successfully completed a Bachelor of Science Degree program in some phase of engineering equivalent to the program leading to this degree in effect at West Virginia University. Admission to the Graduate School does not necessarily assure entrance into the College of Engineering Ph.D. program. Normally, applicants are expected to have either (1) a minimum of 3.0 (B) average computed from the last two academic years of course work completed for the Bachelor of Science degree, or (2) a Master of Science degree from an institution having an accredited undergraduate program in the field in which the Master of Science degree was awarded.

Requirements for Candidacy. After admission to the program and after a period of residence, the applicant will be admitted to a comprehensive preliminary or qualifying examination (either oral or written or both) in which he must demonstrate: (a) a grasp of the important phases and problems of the field of study in which he proposes to major and an application of their relation to other fields of human knowledge and accomplishments; (b) the ability to employ rationally the instruments of research developed in his major field; and (c) the ability to read two approved languages, of which one must be French or German, in a satisfactory manner.

When an applicant has successfully passed his qualifying examination he will be formally admitted to candidacy for the Doctor's degree. Admission to candidacy must precede the final examination for the Doctor's degree by at least one academic year. Graduate courses pursued in fulfillment of the requirements for the Master's degree, if of suitable character and quality, may be credited toward the doctorate.

Curriculum. The Degree of Doctor of Philosophy is not awarded for the mere accumulation of course credits nor for the completion of a definite residence requirement. The exact amount and nature of the course work to be undertaken by a candidate will be established for each individual candidate with the object of insuring a rational and coherent progression of academic development beyond the Bachelor of Science degree. A minimum of 60 semester hours of course work beyond the Bachelor's degree is required exclusive of research or thesis, except research or thesis credits not to exceed 6 hours earned towards the Master's degree. No more than 36 semester hours of graduate course work may be taken in absentia and transferred to West Virginia University for application toward the requirements of the Doctor of Philosophy degree.

Residence. The requirements for the degree of Doctor of Philosophy contemplate at least three years of full-time graduate work beyond the Bachelor's degree. A minimum of 36 weeks in residence in full-time graduate study or its equivalent at West Virginia University is required, and must include a minimum of two semesters at the University.

Thesis. The candidate must submit a thesis on a topic within the area of his major interest. The thesis must represent the results of independent research and must constitute a definite contribution to knowledge. It is anticipated that the work leading to the completion of the thesis would require the equivalent of approximately 30 semester hours.

Final Examination. Upon completion and approval of the thesis and fulfillment of all other requirements, the candidate shall pass a final oral examination conducted by a committee of at least five members recommended by the major department and appointed by the Dean of the Graduate School. The examination shall be primarily a defense of the thesis although other questions necessary to establish the validity of the thesis may be in order.

AERO-SPACE ENGINEERING

MASTER OF SCIENCE IN AERO-SPACE ENGINEERING

Students must comply with rules and regulations as outlined in General Requirements for graduate work in the College of Engineering.

Thesis. Normally a thesis is required of all candidates for the degree of Master of Science in Aero-Space Engineering. Approval by the Advisory and Examining Committee is necessary before the thesis will be accepted. The thesis must be presented in a form that conforms to general requirements of the Graduate School, and in addition should conform to additional thesis requirements of the Department of Aero-Space Engineering.

Whether or not a thesis is required shall be determined by the department and shall be recorded in the student's file as a part of his planned program.

Final Examination. Each candidate for the Master's degree shall pass a final examination administered by his Advisory and Examining Committee. This examination may be written, or oral, or both, and may cover course material. If a thesis has been required, the examination shall also cover the thesis.

Courses. The following grouping of courses is given as a guide for selecting a graduate program leading to the degree of Master of Science in Aero-Space Engineering.

Group I. Required of all candidates. Six semester credit hours of advanced mathematics beyond a first course in differential equations.

Group II. Major. Minimum of 9 semester hours of Aero-Space Engineering courses, other than A.E. 397, in the 300 series.

In order to meet the minimum requirements for the degree of Master of Science in Aero-Space Engineering, additional courses may be taken from the following, subject to the approval of the student's Advisory and Examining Committee:

1. Courses from Groups I and II.
2. Aero-Space Engineering courses in the 200 series which are not required for the degree of Bachelor of Science in Aero-Space Engineering of West Virginia University.
3. Physics courses in the 200 or 300 series.
4. Courses in other departments of the College of Engineering in the 200 or 300 series.

A.E.

201. FLUID DYNAMICS I. 4 hr. PR: Math. 253; or conc: M.E. 120, A.E. 116. Standard atmosphere, thermodynamics of fluid flow, types of fluid motion, airfoils, wings, drag, heat transfer through boundary layers, introduction to flight vehicle performance. 4 hr. lec.
202. FLUID DYNAMICS III. 3 hr. PR: Math 253, A.E. 201. Steady flow of incompressible fluids. Stream functions and potential theory of two dimensional ideal flows. Flow equations in vector notation. Conformal transformations and airfoil development. Viscous and three dimensional effects on ideal flows. Two and three dimensional vortex flows. 3 hr. lec.
203. APPLIED AERODYNAMICS. 3 hr. PR: A.E. 209. Chordwise and spanwise airload distribution for plain wings, wings with aerodynamic and geometric twist, wings with deflected flaps, and wings with ailerons deflected. Section induced drag characteristics. 3 hr. lec.
205. EXPERIMENTAL FLUID DYNAMICS. 2 hr. PR: A.E. 223. Subsonic and supersonic wind tunnel testing methods and practice. Experiments include the following measurements: pressure distribution on bodies, boundary layer determination, turbulence measurements, force tests, and stability and performance determinations. Corrections for scale and jet boundary effects. Data collection. Data reduction by digital computer. Test design, data analysis, and engineering report preparation. 1 hr. lec., 3 hr. lab.
207. FLIGHT VEHICLE DESIGN. 3 hr. PR: A.E. 209. Preliminary design of flight vehicles. Vehicles are designed with regard for performance and stability requirements, considering aerodynamic, weight and balance, structural arrangement, configuration, guidance, and propulsive effects. Layout drawings and calculations are combined in a preliminary design report. 1 hr. lec., 6 hr. lab.
208. FLIGHT TESTING. 2 hr. PR: A.E. 209. Flight test theory and practice. Stability and performance determination based on flight test of Cessna 182 airplane. Flight test data reduction practice. 1 hr. lec., 3 hr. lab.
209. FLIGHT MECHANICS. 3 hr. PR: A.E. 201. Performance estimation with emphasis on fixed wing aircraft. Fundamental concepts of stability and control of aircraft. 3 hr. lec.
210. FLIGHT VEHICLE STRUCTURES I. 3 hr. PR: T.A.M. 103. Design of elementary structural forms, truss analysis and use of thin sheet in aero-space vehicles. Deflections by Virtual Work. Least Work and Williot Diagram. 3 hr. lec.
211. FLIGHT VEHICLE STRUCTURES II. 3 hr. PR: A.E. 210 or equiv. Continuation of A.E. 210. Analysis and design of statically indeterminate structures used in flight vehicles. Emphasis on achieving high strength/weight ratios. 3 hr. lec.
212. DESIGN OF FLIGHT STRUCTURES I. 3 hr. PR: A.E. 207 and A.E. 211. Structural design of flight vehicle members. Layout and detail design of specified components are required. 1 hr. lec., 6 hr. lab.
213. EXPERIMENTAL FLIGHT VEHICLE STRUCTURES. 1 hr. PR: A.E. 211. Strength tests of flight vehicle materials, center of gravity determination, static test of components, bending and torsion of shell structures, compression tests of thin-walled structures. 3 hr. lab.

217. DESIGN OF FLIGHT STRUCTURES II. 3 hr. PR: T.A.M. 103. Analysis and detail design of simple fittings, beams, welded structures, forgings, castings. Methods of production and fabrication. 1 hr. lec., 6 hr. lab.
218. AEROLASTICITY. 3 hr. PR: A.E. 210. The study of vibrating systems of single degree and multiple degrees of freedom, flutter theory and modes of vibration, torsional divergence and control reversal. 3 hr. lec.
219. INTRODUCTION TO RESEARCH. 1-3 hr. PR: Senior standing and consent. An introduction to the methods of organizing theoretical and experimental research. Formulation of problems, project planning, and research proposal preparation.
220. RESEARCH PROBLEMS. 2-6 hr. PR: 219. Performance of the research project as proposed in A.E. 219. Project results are given in written technical reports, with conclusions and recommendations.
223. FLUID DYNAMICS II. 3 hr. PR: A.E. 201, M.E. 120. Analysis of one dimensional compressible flows including effect of friction and heat transfer. Normal and oblique shock waves. Variable area flow. Introduction to multi-dimensional flow covering linearized theory and method of characteristics. 3 hr. lec.
224. FLIGHT VEHICLE PROPULSION. 3 hr. PR: A.E. 223. Application of thermodynamics and gas dynamics to combustion. Turbine cycles with emphasis on turboprop and turbojet propulsion. Ramjets. Rocket propulsion by chemical, nuclear and electrical systems. Propulsion of staged vehicles. 3 hr. lec.
225. GUIDED MISSILE SYSTEMS. 3 hr. PR: A.E. 223, and/or conc: A.E. 224. Design philosophy according to mission requirements. Preliminary configuration and design concepts. Aerodynamics effects on missiles during launch and flight. Ballistic missile trajectories. Stability determination by analog simulation. Performance determination by digital and analog simulation. Control guidance and propulsion systems. Operational and reliability considerations. 3 hr. lec.
226. FLUID DYNAMICS IV. 3 hr. PR: A.E. 223. Shock tube theory and applications. Introduction to kinetic theory, the calculation of viscosity and thermal conductivity. Fundamentals of hypersonic flow and the determination of minimum drag bodies. 3 hr. lec.
280. AERO-SPACE PROBLEMS. 1-3 hr. Upper division and graduate.
299. THESIS. 2-6 hr. PR: Senior standing and consent.
351. DYNAMICS OF VISCOUS FLUIDS. 3 hr. PR: A.E. 202. Exact solutions of the Navier-Stokes equations. Laminar boundary layer theory covering similarity solutions and integral methods. Introduction to turbulent flow. 3 hr. lec.
352. INTERNAL AERODYNAMICS. PR: A.E. 223. Systematic and comprehensive treatment of the flow characteristics of diffusers in general and inlet diffusers in particular. Diffuser with the normal shock; flow process and efficiency in one dimensional analysis. Diffusers with variable geometry, and diffusers with external compression. Spike diffusers and subcritical and near critical non-stationary flow process (buzz frequency and intensity). 3 hr. lec.
353. ADVANCED FLUID DYNAMICS. 3 hr. PR: A.E. 202. Advanced usage of complex variables, conformal transformation, and stream functions. Extension to three dimensional steady flow. Green's Theorem, Stokes' Theorem, and application of vector notation and methods. Subsonic and supersonic flow. Flow about two and three dimensional bodies by slender body and small-perturbation theory. Similarity rules of high speed flow. Hodograph solutions. 3 hr. lec.
354. ADVANCED FLIGHT MECHANICS. PR: A.E. 209, 223. Dynamic stability. Obtaining flight characteristics of the vehicle from dynamic flight test techniques,

such as frequency response, and transient response methods. The problems of automatic control. 3 hr. lec.

- 355. GAS DYNAMICS. 3 hr. PR: A.E. 223. Nonsteady gas dynamics and shock tube theory. Applications of shock tubes in aero-space research. Compressible flow theory in the subsonic, transonic and supersonic regime. 3 hr. lec.
- 356. FLUID FLOW MEASUREMENTS. 3 hr. PR: A.E. 205, 223. The principles and measurements of: static and dynamic pressures and temperatures, velocity and Mach number, forces. Optical techniques and photography. Design of experiments. Review of selected papers from the literature. 2 hr. lec., 3 hr. lab.
- 357. SPECIAL PROBLEMS. 2-4 hr. PR: Consent of department chairman. A course for graduate students in the non-research program. The student will select a specialized field and follow a course of study in that field under the supervision of a counselor.
- 358. SPACE MECHANICS. 3 hr. PR: Math. 245; A.E. 223, 224. Variational formulation of mechanics. Theory of orbits and trajectories with applications to astronomical problems. Introduction to the space environment of the solar system. 3 hr. lec.
- 359. AERODYNAMIC HEATING. 3 hr. PR: Math. 253, A.E. 351, or M.E. 330. Extension of the analysis of laminar and turbulent boundary layer theory to include compressibility and real gas effects. Slip flow and free molecular flow. Application to high speed vehicles. 3 hr. lec.
- 372. ADVANCED AEROELASTICITY. 3 hr. PR: A.E. 218. Deformation of structures under static and dynamic loads, flutter of straight and swept wings, disturbed motion of an elastic model, dynamic response in gusts and landings, the aeroelastic model theory. 3 hr. lec.
- 373. DYNAMIC LOADS. 3 hr. PR: A.E. 203, 218. Dynamics of a particle, lift distribution during accelerated maneuvers, beam bending and torsion with unsteady loads, empennage loads during dynamic flight conditions, landing impact loads. 3 hr. lec.
- 374. MATERIALS AND THEORIES OF FAILURE. 3 hr. PR: A.E. 211. Failures in simple stress states, combined stress states; method of fatigue failures, minimum weight structures, evaluation of material to resist design load condition. 3 hr. lec.
- 375. ADVANCED FLIGHT VEHICLE STRUCTURES. 3 hr. PR: A.E. 211. Incomplete tension fields, critical loads, torsional column failure, instability of flat sheets, cylindrical structure, special methods of analysis. 3 hr. lec.
- 397. RESEARCH. 1-6 hr. Advanced research or special investigations on some topic relating to aero-space engineering.

AGRICULTURAL ENGINEERING

MASTER OF SCIENCE IN AGRICULTURAL ENGINEERING

Before being admitted to graduate work in the Department of Agricultural Engineering, the prospective student must be admitted to the Graduate School. Candidates for the M.S. in Agricultural Engineering Degree must first satisfy the requirements of the B.S. in Agricultural Engineering Degree or its equivalent from a recognized Agricultural Engineering Department. In general, candidates must meet the requirements of the B.S. in Agricultural Engineering Degree, but candidates who have an engineering degree other than the B.S. in Agricultural Engineering Degree may choose the M.S. Degree in Engineering and need not satisfy or remove the requirements for the B.S. in Agricultural Engineering Degree.

Thesis. A thesis is required of all candidates for the M.S. in Agricultural Engineering Degree or M.S. Degree in Engineering. In most cases it will be necessary to take 6 hours of research work, Agricultural Engineering 397. A thesis, however, is not automatically approved after the required number of semester hours of research

work have been completed. The candidate may find that completion of the thesis for approval will delay his originally anticipated date of graduation. The major subject, including thesis, must be taken in the Department of Agricultural Engineering. Candidates may specialize in power and field machinery, soil and water conservation, farm structures, or electric power and processing. On satisfactory completion of his thesis and course work, the candidate will be given an examination by his special committee.

Thesis Supervisor. Each student will be assigned a thesis supervisor who will serve as chairman of his graduate committee.

Ag.E.

200. SEMINAR. 1 hr. PR: Senior or graduate standing.

220. AGRICULTURAL PROCESS ENGINEERING. 3 hr. PR: C.E. 115, M.E. 121. Application of the fundamentals of engineering to agricultural engineering processes. 2 hr. rec., 1 hr. lab.

230. FARM POWER. 4 hr. PR: M.E. 121. Fundamental theories underlying design and operation of internal combustion engines and tractors used in agriculture. 3 hr. rec., 3 hr. lab.

240. HYDROLOGY. 3 hr. PR: C.E. 115. Study of the hydrologic cycle with emphasis on precipitation and runoff as related to design of hydraulic structures, soil and water conservation, and flood control. 2 hr. rec.

320, 321. SPECIAL TOPICS. 1-6 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hours; maximum credit, 6 hours.)

397. RESEARCH. 1-6 hr.

CHEMICAL ENGINEERING

MASTER OF SCIENCE IN CHEMICAL ENGINEERING

H. P. SIMONS, *Program Director*

Students must comply with rules and regulations as outlined in General Requirements for graduate work in the College of Engineering.

A student is admitted to candidacy for the Master of Science in Chemical Engineering degree only on formal written application after he has completed at least 12 credit hours of graduate work in West Virginia University with a grade-point average of at least 3.0.

Thesis Supervisor. Each student will be assigned to a thesis supervisor who will serve as chairman of his thesis committee.

Thesis. Normally a thesis is required of all candidates for the M.S.Ch.E. Degree, and in practically all cases it will be necessary to take all the 6 semester hours of research work, Ch.E. 397. A thesis, however, is not automatically approved after the required number of semester hours of research work have been completed. In fact, students may find that completion of the thesis will delay their originally anticipated date for graduation.

A typewritten or mimeographed thesis will be required. This must conform to the general requirements of the Graduate School, as well as to any additional thesis requirements of the Department.

Courses. Admission to the M.S.Ch.E. program presupposes a mathematics background at least through differential equations. The courses required will include Ch.E. 341, 344, 345 and at least two courses selected from the group Ch.E. 302, 304, 306, and 307. Elective courses may include advanced courses in physics, chemistry or mathematics. In general, at least half of the courses should be chosen from the 300 group.

Facilities. The laboratories for Chemical Engineering are well equipped for fundamental study and research in the various phases of heat, momentum and mass transfer, and in rate processes. The control laboratory immediately adjacent is provided with the latest measurement and control instruments and a forty-five amplifier analog computer for process dynamics and systems engineering.

MATERIALS SCIENCE ENGINEERING

H. V. FAIRBANKS and P. R. JONES, *Program Co-directors*

Admission. The graduate program in Materials Science Engineering leading to the degree of Master of Science in Engineering is open to any graduate of an accredited engineering curriculum, and is administered by the Department of Chemical Engineering.

Courses. In general, the courses required in this program are Physics 270 and 271, Ch.E. 248, and Mat.E. 250, 255, 260, 265, 269, and 397. A satisfactory thesis is required. It is suggested that electives be chosen from the group Mat.E. 254, 261, 350, 351, 352, 360, 361, Ch.E. 341, Nuc.E. 392, and T.A.M. 200, 203, and 310. Other elective courses may be used by permission of the program co-directors.

Facilities. The specialized facilities for Materials Science Engineering include well equipped laboratories for the complete preparation, examination and testing of materials including ceramics, metals, alloys and synthetics, and for research in these areas. In addition, the laboratory facilities of other departments may be utilized.

NUCLEAR ENGINEERING

J. A. KENT, *Program Director*

Admission. The program for the Degree of Master of Science in Nuclear Engineering is administered by the Department of Chemical Engineering. The work offered in the department has been approved by the Atomic Energy Commission for recipients of Atomic Energy Commission Special Fellowships in Nuclear Energy Technology.

Before being admitted to candidacy for the Degree of Master of Science in Nuclear Engineering, the prospective student must be admitted to the Graduate School. Applicants with the Degree of Bachelor of Science in one of the major branches of engineering from an accredited engineering department will be admitted, provided they have had a course in differential equations.

Courses. A fairly rigid curriculum is followed for the M.S.N.E. Degree. This is necessary in view of the fact that students of diverse backgrounds may be admitted for this degree.

The required courses for the degree are: Physics 225, 226, 287, 288; Nuc.E. 390, 391, 392, 393, and a research thesis. In addition, 6 hours of related elective courses are required. Approved electives include Math. 357 and 358; Ch.E. 306 and 344; and M.E. 330 and 331. Other elective courses may be taken, subject to the approval of the candidate's adviser.

The nuclear engineering curriculum is approved for participation in the Atomic Energy Commission Special Fellowships Program.

Facilities. The specialized facilities for nuclear engineering include a swimming pool reactor, a subcritical reactor, electronic nuclear reactor simulator, graphite sigma pile, 10,000 curie and 1,000 curie Cobalt-60 irradiators, and a modern radioisotopes laboratory for instruction and research. The various departments in the College of Engineering are also well equipped for a variety of research projects which are applicable to the field of nuclear technology.

THE DEGREE OF DOCTOR OF PHILOSOPHY

H. P. SIMONS, *Program Director*

Candidates for the degree of Doctor of Philosophy are urged to complete the requirements for the M.S.Ch.E., M.S.E., or the M.S.N.E. degree. In addition to the general requirements of the Graduate School, candidates are required to take the following courses: Ch.E. 302, 304, 306, 307, 323, 324, 341, 344, and 345.

The research work for a doctoral dissertation should show a high order of originality on the part of the student and must offer an original contribution to the field of engineering science. It must have good literary form and style, must give a thorough survey of the prior art with acceptable standards of documentation. Upon completion of the dissertation, the candidate is required to take a final oral examination. This examination is designed to bring out the candidate's logic, critical ability and reasoning power, and is based upon the field covered by the dissertation.

CHEMICAL ENGINEERING

Ch.E.

210. PROCESS ENGINEERING. 3 hr. PR: Ch.E. 208. Process equipment calculations for unsteady state. Determination of maximum and minimum process conditions. Economics of processing methods. 3 hr. rec.
224. PROCESS DEVELOPMENT. 3 hr. PR: Chem. 238 and 261, Ch.E. 202, 206, and 243. Development of process systems from the unit operations-unit process concept. Use of thermodynamics and kinetics in the evaluation of system requirements and performance. 3 hr. rec.
- *234. CHEMICAL TECHNOLOGY. 2 hr. PR: Chem. 233. A study of some of the manufacturing procedures employed in the process industries, including theory, equipment, and economics. Primarily for Chemistry majors. 2 hr. rec.
- *235. CHEMICAL TECHNOLOGY. 2 hr. PR: Chem. 233. Similar to Ch.E. 234. 2 hr. rec.
242. CHEMICAL ENGINEERING THERMODYNAMICS AND KINETICS. 3 hr. PR: Chem. 261. Material and energy balances; internal energy levels; statistical distributions and statistical evaluation of thermodynamic functions; empirical evaluation of thermodynamic functions; second law of thermodynamics; thermodynamic properties of solutions and solid phases; chemical and physical equilibria. Kinetics of simple and complex chemical reactions; development of rate equations. Kinetics of vapor phase-catalytic reactions; development of rate equations and mechanisms of reactions; back mixing. 3 hr. rec.
243. CHEMICAL ENGINEERING THERMODYNAMICS AND KINETICS. 3 hr. Continuation of Ch.E. 242. 3 hr. rec.
248. STATISTICAL DESIGN OF EXPERIMENTS. 2 hr. PR: Math. 253 or consent. Development of the principles of factorial design based on selected observations. Other design procedures such as confounding, composite design and evolutionary operations, with applications to chemical engineering and related fields. Evaluation of the factors affecting systems, development of factor interrelations and the nature of interactions. Determination of optimum conditions. Computing technics. 2 hr. rec.
272. CHEMICAL ENGINEERING DESIGN. 3 hr. PR: Ch.E. 207, T.A.M. 102, and Econ. 2. Design of process equipment from economic, chemical and engineering considerations. Study of plant location and layout. 2 hr. rec., 3 hr. lab.
273. CHEMICAL ENGINEERING DESIGN. 3 hr. Continuation of Ch.E. 272. 2 hr. rec., 3 hr. lab.
280. CHEMICAL ENGINEERING PROBLEMS. 1-6 hr. For junior, senior and graduate students.
283. PROCESS DYNAMICS. 3 hr. PR: Math. 253, Ch.E. 207. Introduction to automatic control and control loop concepts, measurement of variables, dynamic properties of instruments, process response, discussion of controller types, derivation of equations for first and second order control systems, derivation of equations for first and second order process, transient analysis of process and control systems, use of analogue computer for process simulation and solution of differential equations. 3 hr. rec.
284. INDUSTRIAL INSTRUMENTATION AND CONTROL. 3 hr. PR: Math. 108. Discussion of process characteristics, theory and application of measuring means. Theory, modes and application of automatic control. Selection and characteristics of final control elements. 3 hr. rec.
286. PETROLEUM TECHNOLOGY. 2 hr. PR: Chem. 233. Discussion of crude oil desalting, distillation, natural gasoline recovery, thermal and catalytic crack-

*Courses may be taken as undergraduate work by students in Colleges and Schools other than the College of Engineering.

ing solvent refining, dewaxing, filtration blending, and compounding of petroleum products. Primarily for students in the School of Mines. 2 hr. rec.

297. **THESIS.** 2-5 hr. A problem in chemical engineering or industrial chemistry is selected for investigation. A carefully prepared report is required. Open only to qualified seniors, 6-15 hr. lab.
300. **SEMINAR.** 1-6 hr. Hours to be arranged.
302. **ADVANCED HEAT TRANSFER.** 2-5 hr. PR: Ch.E. 207, 243, Math. 253. Theory of steady and transient conduction, radiation heat transfer, dimensional analysis and analogy, natural convection, forced convection, heating and cooling inside and outside tubes, finned tubes and compact heat exchangers, packed and fluidized system heat transfer, heat transfer in condensing vapor, heat transfer in boiling liquids and evaporation, high velocity flow heat transmission, application to process heat transfer and design. 3 hr. rec., 0-6 hr. lab.
304. **ADVANCED MASS TRANSFER.** 2-5 hr. PR: Ch.E. 207, 243, Math. 253. Theory of diffusion, interphase mass transfer theory, simultaneous mass and heat transfer, principles of design, equipment survey, mechanical operations, mass transfer performance, scale-up practices, mass transfer in solid-gas and solid-solid phases, liquid-liquid extractions. 3 hr. rec., 0-6 hr. lab.
306. **ADVANCED FLUID DYNAMICS.** 2-5 hr. PR: Ch.E. 207, 243, Math. 253. Vector and tensor analysis, differential equations of fluid flow, flow of nonviscous fluid, laminar flow, turbulent flow, analogy between fluid momentum, mass and heat transfer, dimensional analysis, the laminar sublayer, flow of fluid past immersed bodies, fluid dynamics of particle suspensions, flow of fluids through porous media, non-Newtonian fluid flow. 3 hr. rec., 0-6 hr. lab.
307. **ADVANCED DISTILLATION.** 2-5 hr. PR: Ch.E. 207 or Chem. 261. Advanced study of vaporization principles of separation of liquid mixtures, steam, batch, continuous, azeotropic, extractive, and molecular distillation. 3 hr. rec., 0-6 hr. lab.
- 323, 324. **ADVANCED PROCESS DEVELOPMENT.** 3 hr. PR: Chem. 238 and 261, Ch.E. 202, 206, 243, and 273. Use of extended and generalized unit process and unit operation concepts; specialized synthetic methods; reaction mechanisms and their effects on equipment design and performance; study of properties, their evaluation, prediction and marketability; industrial toxicology and plant safety. 3 hr. rec.
341. **MATHEMATICAL METHODS IN CHEMICAL ENGINEERING.** 3 hr. PR: Math. 253. Emphasis is placed upon the formulation of the differential and difference equations, both ordinary and partial, governing chemical engineering operations. Analytic and numerical techniques used for their solutions include transform methods. 3 hr. rec.
344. **ADVANCED CHEMICAL ENGINEERING THERMODYNAMICS.** 3 hr. PR: Ch.E. 243. Review of thermodynamic transformations, use of Jacobians; advanced applications to chemical and physical equilibria; development and applications of phase rule; equilibria diagrams for nonideal systems; determination and use of activity coefficients; methods of estimating thermodynamic functions; introduction to statistical mechanics. 3 hr. rec.
345. **ADVANCED CHEMICAL ENGINEERING KINETICS.** 3 hr. PR: Ch.E. 243. Applications of chemical kinetics to industrial reactor design; review of physical chemical principles; theories of reactions; design of batch and flow reactors; theories of catalysis; reactor mechanisms; data interpretation; applications to design of catalytic reactors; effects of diffusion on catalytic reactions. 3 hr. rec.
372. **ADVANCED CHEMICAL ENGINEERING DESIGN.** S. 2-5 hr. PR: Ch.E. 273. Critical discussion of and practice in equipment-design methods. 2 hr. rec., 0-9 hr. lab.
383. **ADVANCED SYSTEMS ENGINEERING.** 3 hr. PR: Ch.E. 283, 284. Control systems and the feed-back concept, transfer functions and mathematical analysis of

dynamic equations, transient analysis and stability of control systems, frequency response of control system, thermal process dynamics, mass transfer dynamics, chemical process dynamics, use of analogue computer for study of system behavior, nonlinear systems and adaptive control, random response and filtering of noise. 3 hr. rec.

397. RESEARCH. 1-10 hr. PR: Ch.E. 207, 212. Suitable problem in chemical engineering, metallurgy, nucleonics, ceramics, or fuels is selected for investigation.

MATERIALS SCIENCE ENGINEERING

Mat.E.

250. ENGINEERING MATERIALS SCIENCE. 3 hr. PR: Physics 112. Includes a study of the internal structures of metals, ceramics, and organic materials and the dependence of properties upon these structures. Also included is the behavior of materials under conditions involving mechanical stresses, thermal reactions, corrosion, electromagnetic fields and radiation. 3 hr. rec.
254. PRINCIPLES OF METALLURGICAL ENGINEERING. 3 hr. PR: Physics 112. Includes the theory and physical principles involved in the production of metals from their ores. 3 hr. rec.
- *255. SYNTHETIC MATERIALS. 3 hr. PR: Physics 112. Properties, uses and methods of production of synthetic materials such as plastics, elastomers, laminates, lubricants and miscellaneous materials of construction. 3 hr. rec.
260. PHYSICAL CERAMICS. 3 hr. PR: Physics 112. The electronic and crystalline structure of ceramic materials; thermodynamics and kinetics of ceramic systems; the mechanical, chemical, electrical, thermal, and optical properties of ceramic materials and the factors affecting them; processing and utilization of ceramic materials.
261. PRINCIPLES OF CERAMIC ENGINEERING. 3 hr. PR: Mat. E. 260. Identification of the factors affecting the properties of ceramic systems through application of factorial design; the development of empirical equations showing the relationships between the factors; development of optimum conditions. 3 hr. rec.
- *265. MATERIALS SCIENCE LABORATORY. 2 hr. PR: Mat.E. 250, 255, 260. Preparation and pretreatment of engineering materials for protomicrography and physical inspection. 6 hr. lab.
- *269. X-RAY DIFFRACTION. 2 hr. The theory of x-ray diffraction and application to the analysis of crystalline materials, using the powder camera and x-ray diffractometer. Open to students in geology, chemistry, engineering, and related fields with permission of the instructor. 1 hr. rec., 3 hr. lab.
350. ADVANCED PHYSICAL METALLURGY. 3 hr. PR: Mat.E. 250. Includes the principles of crystallization, plastic deformation, precipitation hardening and the transformation of austenite. 3 hr. rec.
351. METALLOGRAPHY LABORATORY. 3 hr. PR: Mat.E. 250. Includes radiography, photomicrography, recrystallization, and heat treatment of ferrous and non-ferrous metals and alloys. 1 hr. rec., 6 hr. lab.
352. ALLOYS. 3 hr. PR: Mat.E. 250. Includes the use of the phase rule, binary and ternary constitutional diagrams, and fundamental principles involved in the formation of alloys. 3 hr. rec.
360. ADVANCED PHYSICAL CERAMICS. 3 hr. PR: Mat.E. 261. The mechanical, chemical, thermal, optical, electrical and magnetic behavior of ceramic materials, together with their evaluation and prediction. 3 hr. rec.

361. CERAMICS LABORATORY. 1 hr. PR: Mat.E. 360. Design of ceramic bodies based on the theoretical behavior; preparation, processing, and measurement of physical properties. 3 hr. lab.

*397. RESEARCH. 1-10 hr.

NUCLEAR ENGINEERING

Nuc.E.

290. INTRODUCTORY NUCLEAR ENGINEERING. 3 hr. PR: Physics 112. Includes elementary nuclear physics necessary for understanding nuclear engineering. Design and operation of nuclear reactors, shielding, instrumentation, health physics, fuel cycles, uses of radioactive isotopes, nuclear propulsion. 3 hr. rec.

380. ADVANCED INDEPENDENT STUDY. 1-3 hr. Special studies in fuel reprocessing, shielding, reactor technology, and related areas.

390. ANALYSIS OF NUCLEAR ENERGY SYSTEMS. 3 hr. PR or conc: Physics 225 or equiv., and Physics 287 or equiv. Probability concepts and nuclear cross sections. Multiplication constant and neutron flux. Diffusion theory. Homogeneous reactors: one group theory; multigroup theory. Heterogeneous reactors. Reflected reactors. Reactor kinetics. Control rod theory. Special considerations in analysis of heterogeneous systems. 3 hr. rec.

391. PRINCIPLES OF NUCLEAR REACTOR ENGINEERING. 3 hr. PR: Nuc.E. 390. Thermal analysis of reactor systems. Shielding. Fuel element design. Reactor poisons. Instrumentation. Economics of nuclear systems. Radiation protection. Legal aspects. Radioactive waste disposal. 3 hr. rec.

392. INTERACTION OF RADIATION AND MATTER. 3 hr. PR or conc: Physics 225. Radiation damage models, effects of nuclear radiations on reactor components and other materials, experimental techniques. Industrial applications: process control, polymerization, sterilization, pasteurization. 3 hr. rec.

393. NUCLEAR LABORATORY. 3 hr. PR or conc: Nuc.E. 390 or equiv. Techniques of radiation measurements. Determination of neutron properties; diffusion length, albedo, etc. Exponential reactor parameters. Reactor simulation. Experiments with swimming pool reactor and cobalt-60 radiation facility. Dosimetry. 1 hr. rec., 6 hr. lab.

397. RESEARCH. 1-10 hr.

CIVIL ENGINEERING

MASTER OF SCIENCE IN CIVIL ENGINEERING

Students must comply with rules and regulations as outlined in General Requirements for graduate work in the College of Engineering.

Courses. No rigid curriculum is prescribed for the degree of Master of Science in Civil Engineering. Graduate level work in mathematics and mechanics is customary and at least 15 hours should be selected from civil engineering courses numbered 300 or above.

Thesis. A thesis is normally required of candidates for the M.S.C.E. degree. The maximum of 6 semester hours credit in research (C.E. 397) is usually devoted to thesis preparation. However, the thesis is not automatically approved after the required number of semester hours of research work have been completed. The thesis must conform with the general requirements of the Graduate School and with any additional requirements established by the Department.

At the discretion of the student's advisory committee a non-thesis program may be established in which either a comprehensive problem or additional course work is substituted for the thesis.

Final Examination. The candidate for the M.S.C.E. degree shall be given an oral or written examination by his advisory and examining committee. The examination shall cover all course material and the thesis, if one is required.

THE DEGREE OF DOCTOR OF PHILOSOPHY

A candidate for the degree of Doctor of Philosophy must comply with the rules and regulations as outlined in General Requirements for graduate work in the College of Engineering. A program designed to meet the needs and objectives of each student will be developed in consultation with the student's committee.

The research work for the doctoral dissertation must show a high degree of originality on the part of the student and must constitute an original contribution to the art and science of civil engineering. The dissertation must have good literary form and style and must present a thorough review of the prior study in the subject with acceptable standards of documentation. The candidate is required to take a final oral examination upon completion of the dissertation. This examination is designed to permit the candidate to demonstrate his ability to present and defend his work orally in a logical manner.

C.E.

210. PHOTOGRAMMETRY. 3 hr. PR: C.E. 104. Geometry and interpretation of the aerial photograph; flight planning; radial-line control; principles of stereoscopy; plotting instruments. 2 hr. rec., 3 hr. lab.
211. GEODESY. 3 hr. PR: C.E. 104 and Math. 108. Precise base line measurements, triangulation and leveling, geodetic astronomy; figure of the earth, map projections; rectangular coordinate systems; least squares adjustment; gravity. 3 hr. rec.
221. ENGINEERING HYDRAULICS. 3 hr. PR: C.E. 145 or consent. Fundamental principles of flow, similitude, flow measurement, water hammer and surging, channel transitions, gradually varied flow, wave motion and sediment transportation. Design of various elements of hydraulic structures. 3 hr. rec.
230. TRAFFIC ENGINEERING. 3 hr. PR: C.E. 131, T.A.M. 104. Principles of traffic operations. The characteristics of drivers, vehicles, and roadways that affect the performance of road systems. Traffic studies relating to origins and destination, accidents, parking, speed, and delays. Consideration of signs, signals, and markings. 3 hr. rec.
231. CONCRETE AND AGGREGATES. 3 hr. PR: C.E. 131, 179, T.A.M. 103. Considerations and methods for the design of concrete mixes. Effect of air entraining agents and other additives. Studies of the influence of aggregate properties on the design and performance of concrete mixtures. An analysis of the methods of test commonly used for concrete and aggregate and the significance of these tests. 3 hr. rec.
236. HIGHWAY MATERIALS LABORATORY. 3 hr. PR: T.A.M. 103. Testing of highway materials for compliance with specifications in the State Road Commission's Materials Testing Laboratory. 1 hr. rec., 6 hr. lab.
251. PUBLIC HEALTH ENGINEERING. 3 hr. PR: C.E. 145. The engineering aspects involved in the control of the environment for the protection of the health and the promotion of the comfort of man. Discussions will include communicable disease control, milk and food sanitation, air pollution, refuse disposal, industrial hygiene and radiological health hazards. 3 hr. rec.
252. WATER RESOURCES ENGINEERING. 3 hr. PR: C.E. 115. The design of water-resource systems. The interrelationship between economic objectives, engineering analysis and governmental agencies. 3 hr. rec.
260. STRUCTURAL ANALYSIS II. 3 hr. PR: C.E. 160. An introduction to the fundamental theory of statically indeterminate structures. General theory of continuity and iterative and energy methods applied to the analysis of indeterminate beams and frames. 3 hr. rec.
261. STATICALLY INDETERMINATE STRUCTURES. 3 hr. PR: C.E. 260. Advanced topics in indeterminate structural analysis for trusses and nonprismatic members. 3 hr. rec.

270. STRUCTURAL DESIGN I. 3 hr. PR or conc: C.E. 260. Theory and design of reinforced concrete members. Design considerations for concrete bridges and buildings. 2 hr. rec., 3 hr. lab.
271. STRUCTURAL DESIGN II. 3 hr. PR or conc: C.E. 260. Design of steel bridge and building structures. Welded, riveted, and bolted connections; simple and moment-resistant connections; cost estimates. 2 hr. rec., 3 hr. lab.
272. PLASTIC DESIGN OF STEEL STRUCTURES. 3 hr. PR: C.E. 260 or consent. The fundamental concepts of the plasticity of steel. Analysis of structures for ultimate load. The influence of axial forces, shear forces, and local buckling on the plastic moment. Study of structural connections and deflections. Steel structure design. 3 hr. rec.
273. PRESTRESSED CONCRETE. 3 hr. PR: C.E. 270. The analysis and design of determinate and indeterminate prestressed beams and frames. 3 hr. rec.
275. REINFORCED CONCRETE. 3 hr. PR: C.E. 160, 170. Theory and design of slabs, beams, columns, footings, retaining walls, and concrete buildings. Introduction to principles of pre-stressed concrete. 2 hr. rec., 3 hr. lab.
280. SOIL MECHANICS. 3 hr. PR: C.E. 115, T.A.M. 101. Origins and distribution of soils, classification of soils, fundamental soil properties and stresses in soils. Subsurface exploration. Introduction to foundations design and the design and construction of earth structures. 2 hr. rec., 3 hr. lab.
281. FOUNDATIONS ENGINEERING. 3 hr. PR: C.E. 131, 280. Soils exploration and the design and analysis of engineering foundations. Particular emphasis on earth pressures and the design of retaining walls, studies of bracing systems and the elements of shallow and deep foundations for bridges and buildings. Movement of water through soil structures and control of water in excavations. 3 hr. rec.
290. CIVIL PROBLEMS. 1-4 hr. For junior, senior, and graduate students.
315. ADVANCED FLUID MECHANICS. 3 hr. PR: C.E. 115. Compressible and non-compressible flow, flow with friction and heat transfer, boundary layer flow, fluid machines, unsteady flow and fluid vibrations.
321. HYDRAULIC STRUCTURES. 3 hr. PR: C.E. 221 or consent. The hydraulic analysis and design of engineering structures such as reservoirs, dams, spillways, gates, and outlet works. The study of hydraulic machinery, irrigation, hydroelectric power, drainage and flood control. 3 hr. rec.
330. BITUMINOUS MATERIALS AND MIXTURES. 3 hr. PR: C.E. 131, 179. Manufacture and testing of bituminous materials. Significance of tests and specifications of bituminous materials. Principles of the design of bituminous mixtures, including methods of test and the influence of aggregate, temperature, and other variables upon design for stability and durability. Production of bituminous mixtures and construction practice in utilizing these mixtures. 2 hr. rec., 3 hr. lab.
331. PAVEMENT DESIGN. 3 hr. PR: C.E. 131, 280. Effects of traffic, soil, and loads on the design of pavement. Consideration of drainage and climate. Design of bases and sub-bases. Methods of design of flexible and rigid pavements. Performance of pavement surveys. 2 hr. rec., 3 hr. lab.
332. HIGHWAY ECONOMICS AND PLANNING. 3 hr. PR: Consent. Studies of the considerations involved in the planning of a well-integrated highway system. Highway administration and financial structure. Methods of establishing economic value of highway improvement. Classification of systems and rating of the performance of roads. Estimation of future traffic and highway needs. 3 hr. rec.
333. GEOMETRIC DESIGN OF HIGHWAYS. 3 hr. PR: Consent. The theory and practice of the geometric design of modern highways. Horizontal and vertical align-

- ment, cross-slope, design speed, sight distances, interchanges, and intersections are discussed. Critical analysis of design specifications. 2 hr. rec. 3 hr. lab.
334. URBAN PROBLEMS. 3 hr. PR: Consent. The study of the particular problems of transportation in the urban area as they relate to the general development of the city. Emphasis is on the role of the engineer in the planning for urban transportation and the relationship of the engineer to the city planner and to the city administration. 3 hr. rec.
 335. SURFACE AND SUBSURFACE DRAINAGE. 3 hr. PR: Consent. The study of the nature and requirements of drainage studies and drainage design as they pertain to transportation facilities. Emphasis is on the theory of drainage design and a critical analysis of drainage practices. 3 hr. rec.
 350. SANITARY CHEMISTRY AND BIOLOGY. 3 hr. PR: C.E. 145, Bact. 248, or consent. Study of the physical and chemical properties of water. Theory and methods of chemical analysis of water, sewage, and industrial wastes. Biological aspects of stream pollution problems. 2 hr. rec., 3 hr. lab.
 352. WATER TREATMENT THEORY. 3 hr. PR: C.E. 350. Theory of the various procedures and techniques utilized in the treatment of water for municipal and industrial use. Review of water quality criteria. 2 hr. rec., 3 hr. lab.
 353. SEWAGE AND INDUSTRIAL WASTE TREATMENT. 3 hr. PR: C.E. 350. Theory and methods of sewage treatment. Chemical, biochemical, and physical factors related to waste treatment. Characteristics of industrial wastes and special considerations necessary for their disposal. 2 hr. rec., 3 hr. lab.
 354. AIR POLLUTION I. 3 hr. PR: Consent. Properties of gases, aerosols and particles in the atmosphere. Particulate sampling and analysis. The planning and operation of atmospheric surveys. 2 hr. rec., 3 hr. lab.
 357. HYDRAULICS OF SANITARY ENGINEERING WORKS. 3 hr. PR: C.E. 221. The application of the techniques of population growth estimation, rainfall and runoff analysis, food flow, and ground water data to the design of sanitary works. Design of water distribution systems and sewerage systems. 2 hr. rec., 3 hr. lab.
 358. DESIGN OF SANITARY WORKS. 3 hr. PR: C.E. 221. The investigation of water supply and waste water treatment facilities. The design of water purification and waste water treatment facilities. 2 hr. rec., 3 hr. lab.
 359. BASIC RADIOLOGICAL HEALTH. 3 hr. PR: Consent. Fundamental theory and terminology. Environmental and occupational hazards in the nuclear field. Laboratory measurements of radioactivity. 2 hr. rec., 3 hr. lab.
 360. STATICALLY INDETERMINATE STRUCTURES. 3 hr. PR: C.E. 260 or consent. General theory of continuity, iterative and classical methods of analysis of skeleton structures with emphasis of the influence coefficient method. 3 hr. rec.
 361. BRIDGE ENGINEERING. 3 hr. PR: C.E. 360. Statistically indeterminate trusses; continuous trusses; steel and concrete arches; long-span and suspension bridges; secondary stresses. 3 hr. rec.
 362. NUMERICAL METHODS OF STRUCTURAL ANALYSIS. 3 hr. PR: C.E. 261 or 360. Methods of successive approximations and numerical procedures for the solution of structural problems. Application of these procedures to the analysis of bridges and buildings. 3 hr. rec.
 363. INTRODUCTIONS TO STRUCTURAL DYNAMICS. 3 hr. PR: Math. 240, C.E. 261 or 360. General theory for dynamic response of systems having one or several degrees of freedom. Emphasis on the application of dynamic response theory to structural design. 3 hr. rec.

375. REINFORCED CONCRETE DESIGN. 3 hr. PR: C.E. 270. Theories of action of beams, slabs, and columns of reinforced concrete; review of standard codes and specifications and their influence on design. 3 hr. rec.
376. BEHAVIOR OF REINFORCED CONCRETE MEMBERS. 3 hr. PR. or conc: C.E. 270 or consent. Studies of the actual behavior and strength of reinforced concrete members by critically reviewing experimental and analytical investigations. Beams subjected to pure flexure, columns subjected to axial compression; combined flexure and compression; combined flexure, shear, and bond. 3 hr. rec.
377. BEHAVIOR OF REINFORCED CONCRETE STRUCTURES. 3 hr. PR: C.E. 376. Continuation of C.E. 376. Studies of behavior and strength of statically indeterminate reinforced concrete structures. Comparison with reinforced concrete codes and specifications.
380. SOIL MECHANICS. 2-6 hr. PR: Consent. Advanced study of soil structure, shear strength, consolidation, and earth pressures. Sand drains, stress distribution, slope stability, seepage.
381. SOIL TESTING. 3 hr. PR: C.E. 280. The testing of soils for engineering purposes including classification, strength, consolidation, compaction, permeability, and special tests. Critical review of test methods and the analysis of test results. Organization and operation of a soils testing laboratory. 1 hr. rec., 6 hr. lab.
382. FOUNDATIONS AND EARTHWORK DESIGN. 3 hr. PR: C.E. 380. Planning and performance of subsurface exploration. Principles of the design and analysis of retaining walls, pile foundations, bulkheads, and shallow and deep foundations. Considerations in the design of embankments and slopes. Problems of soft ground and rock construction. 3 hr. rec.
390. ADVANCED DESIGN PROBLEMS. 2-6 hr. A design or investigation of any assigned problem related to civil engineering.
395. SEMINAR. 1-2 hr. PR: Consent. Studies and group discussions of structural, fluid mechanics, surveying, transportation, and sanitary problems.
397. RESEARCH. 2-6 hr. Original report or investigation on some topic in the civil engineering field.

ELECTRICAL ENGINEERING

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

Students must comply with rules and regulations as outlined in General Requirements for graduate work in the College of Engineering.

Thesis. Normally a thesis is required of all candidates for the degree of Master of Science in Electrical Engineering. Approval by the Advisory and Examining Committee is necessary before the thesis will be accepted. The thesis must be presented in a form that conforms to general requirements of the Graduate School, and in addition should conform to additional thesis requirements of the department.

Whether or not a thesis is required shall be determined by the department and shall be recorded in the student's file as a part of his planned program.

Final Examination. Each candidate for the Master's degree shall pass a final examination administered by his Advisory and Examining Committee. This examination may be written or oral or both and shall cover the course material. If a thesis has been required, the examination shall also cover the thesis.

Courses. The following grouping of courses is given as a guide for selecting a graduate program leading to the degree of Master of Science in Electrical Engineering.

Group I. <i>Required of all candidates.</i>	<i>Hr.</i>
E.E. 300. Seminar (2 semesters)	1
E.E. 325. Advanced Linear Credit Analysis	3
E.E. 326. Advanced Electric and Magnetic Field Theory	3

Group II. <i>Major (Minimum of 6 hours from the following).</i>	
E.E. 301. Electrical Power Systems	3
E.E. 310. Switching Circuit Theory I	3
E.E. 311. Switching Circuit Theory II	3
E.E. 330. Electrical Machinery	3
E.E. 348. Nonlinear Problems in E.E.	3
E.E. 350. Electronic Circuits	3
E.E. 365. Noise Theory	3
E.E. 386. Servomechanisms	3
E.E. 387. Sampled-Data Control Systems	3

Group III. *Minor.*

*Math. 251 and Math. 256 or Physics 225 and Physics 226	6
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*Note: Candidates who have received credit for Math. 251 and/or Math. 256 (or their equivalent) may substitute other approved Mathematics courses.

In order to meet the minimum requirements for the degree of Master of Science in Electrical Engineering additional courses may be taken from the following, subject to the approval of the student's Advisory and Examining Committee:

1. Courses from Groups II and III.
2. Electrical Engineering courses in the 200 series which are not required for the degree of Bachelor of Science in Electrical Engineering at West Virginia University.
3. Physics courses in the 200 or 300 series.
4. Courses in other departments of the College of Engineering in the 200 and 300 series.

E.E.

200. SEMINAR. (credit) PR: Senior standing. Special material and projects.
205. ELECTRICAL FUNDAMENTALS. 4 hr. PR: E.E. 105. Fundamentals and operating characteristics of electrical machines and transformers. Electron tube, phototube, and transistor characteristics. Electronic circuits. (Not open to electrical engineering students.) 3 hr. rec., 3 hr. lab.
225. ELECTRIC CIRCUITS. 4 hr. PR: E.E. 125. Distributed circuits (transmission lines) steady state analysis of distributed circuits, simulation of distributed circuits by equivalent lumped parameter circuits. Interpretation of transmission line as general four terminal network (A B C D constants), matrix methods of combination of four terminal networks, introduction of "modern" network analysis. 3 hr. rec., 3 hr. lab.
226. ELECTROMAGNETIC FIELDS. 3 hr. PR: E.E. 126. Plane waves in dielectric media; plane waves in conducting media; transmission lines; wave guides; antennas. 3 hr. rec.
232. ELECTROMECHANICAL DEVICES. 4 hr. PR: E.E. 125, 126. Fundamentals of electromechanical energy conversion. Transformers and rotating machines. 3 hr. rec., 3 hr. lab.
233. ELECTROMECHANICAL DEVICES. 4 hr. PR: 232. Analysis of machine-performance by the principles of electromechanical energy conversion. 3 hr. rec., 3 hr. lab.
235. ELECTRICAL MACHINERY. 3 hr. PR: E.E. 233 or consent. Synchronous machines, windings, calculation of emf and mmf; mmf space functions. Potier diagram, ASA regulation, 2-reactance diagrams. Multiple-winding transformers and auto transformers. 2 hr. rec., 3 hr. lab.

236. ELECTRICAL MACHINERY. 3 hr. PR: E.E. 233 or consent. Commutation theory of machines, d-c and a-c multiple-winding and special purpose machines; multiple machine systems. 2 hr. rec., 3 hr. lab.
252. ELECTRONICS. 3 hr. PR: E.E. 152. Analysis of power amplifiers, tuned amplifiers, oscillators, modulators, demodulators, and wave-shaping circuits. 3 hr. rec.
257. TRANSISTOR CIRCUITS. 3 hr. PR: E.E. 252 or consent. A study of the general operating properties of the transistor as a circuit element. 3 hr. rec.
261. NETWORKS AND FILTERS. 3 hr. PR: E.E. 225 or consent. Analysis and synthesis of network and filters. 3 hr. rec.
262. ELECTRONIC AND COMMUNICATIONS LABORATORY. 2 hr. PR: E.E. 252 or consent. A study of tuned amplifiers, oscillators, modulators, wave-shaping circuits, transmission line characteristics, and special topics. 6 hr. lab.
264. COMMUNICATIONS ENGINEERING. 3 hr. PR: E.E. 252 or consent. Study and analysis of radio transmission, receiving and sound systems, frequency modulation, television radiation and propagation. 3 hr. rec.
270. ENGINEERING ANALYSIS AND DESIGN. 3 hr. PR: E.E. 232, 252. Formulation and application of the method of engineering analysis based upon fundamental physical laws, mathematics, and practical engineering considerations. Emphasis is placed on the professional approach to the analysis of engineering problems. 3 hr. rec.
271. THEORY OF DIGITAL COMPUTERS. 3 hr. PR: Senior standing in Engineering or Mathematics. An introduction to the field of digital computer design. Topics include general computer organization, number systems and number representations, design characteristics of major computer units, Boolean algebra and its application to computer design and sequencing of basic arithmetic processes in a computer. 3 hr. rec.
272. DIGITAL COMPUTER LOGIC DESIGN. 3 hr. PR: E.E. 271 or consent. This course is a sequel to E.E. 271. Topics include binary arithmetic (counting, addition, subtraction, multiplication, division), characteristics of control units, decimal arithmetic, and advanced topics. 3 hr. rec.
275. PULSE TECHNIQUES. 3 hr. PR: E.E. 225, 252. An introduction to the response of electrical networks to non-sinusoidal inputs, the analysis of active networks with large signals and the circuits and techniques used in pulse and digital equipment. 3 hr. rec.
280. ELECTRICAL PROBLEMS. 1-3 hr. For junior, senior, and graduate students.
281. ELECTRICAL POWER SYSTEMS. 3 hr. PR: E.E. 226 or consent. Polyphase transformation with three-phase and with single-phase transformers. Principles of circuit protection and relaying. Principles of grounding. Introduction to symmetrical components. 2 hr. rec., 3 hr. lab.
282. SYMMETRICAL COMPONENTS. 3 hr. PR: E.E. 226 or consent. An application of the methods of symmetrical phase components in calculating currents in systems under various types of unbalanced conditions. 3 hr. rec.
285. ELECTRIC-POWER TRANSMISSION AND DISTRIBUTION. 3 hr. PR: E.E. 226. A study of circle diagrams applied to the various problems of power transmission; phase modifier applications and an introduction to power system stability. 3 hr. rec.
286. FUNDAMENTALS OF SERVOMECHANISMS. 3 hr. PR: E.E. 225. Fundamental analysis of the servomechanisms and automatic control devices. 3 hr. rec.
287. INDUSTRIAL ELECTRONICS AND CONTROLS. 3 hr. PR: Consent. A study of electronic and magnetic control equipment and its application in industry. 3 hr. rec.

288. ANTENNAS. 3 hr. PR: E.E. 264 or consent. Analysis and design of antenna systems. 3 hr. rec.
293. ANALOGUE COMPUTERS. 3 hr. PR: Math. 253. A study of the theory and operation of analogue computers. Amplitude scaling and time scaling on the analogue computer and application of the analogue computer to the solution of differential equations. 3 hr. rec.
299. ULTRA-HIGH FREQUENCY TECHNOLOGY. 3 hr. PR: E.E. 264 or consent. Study of special problems encountered at high and ultra-high frequencies. 3 hr. rec.
300. SEMINAR. 1-3 hr. PR: Consent. Discussion of research in electrical engineering and special problems.
301. ELECTRICAL POWER SYSTEMS. 3 hr. PR: E.E. 281 or consent. Load flow problems. Transient and steady state stability of systems. The principles of the application of network analyzers and other computing devices to the solution of power system problems. 3 hr. rec.
310. SWITCHING CIRCUIT THEORY I. 3 hr. PR: E.E. 271 or consent. This course together with E.E. 311 provides the basis for mathematical switching theory. Boolean algebra and related systems are developed from the postulational approach and applications to the theory of computers and automata are studied in detail. The emphasis is upon setting up of mathematical models and a careful study of their properties rather than upon logical design and/or techniques of computation. 3 hr. rec.
311. SWITCHING CIRCUIT THEORY II. 3 hr. PR: E.E. 310. This course is a continuation of E.E. 310. 3 hr. rec.
325. ADVANCED LINEAR CIRCUIT ANALYSIS. 3 hr. PR: Consent. Systematic formulation of circuit equations using topological methods. Application of matrix algebra and complex variables theory to circuit analysis. 3 hr. rec.
326. ADVANCED ELECTRIC AND MAGNETIC FIELD THEORY. 3 hr. PR: Consent. Maxwell's equations. Electromagnetic waves. Poynting vectors, guided waves. 3 hr. rec.
330. ELECTRICAL MACHINERY. 3 hr. PR: E.E. 235 or consent. Advanced theory of synchronous and induction machinery following Parks-Doherty-Nickel theory; applications of matrix algebra and tensor analysis. 3 hr. rec.
348. NONLINEAR PROBLEMS IN ELECTRICAL ENGINEERING. 3 hr. PR: Consent. A study of the solution of nonlinear differential equations encountered in electrical engineering and automatic control. 3 hr. rec.
350. ELECTRONIC CIRCUITS. 3 hr. PR: E.E. 252. An advanced study for the analysis and design of electronic circuits. 3 hr. rec.
351. PHYSICAL ELECTRONICS. 3 hr. PR: E.E. 252. Application of principles of physics to predict the external characteristics of electronic devices. 3 hr. rec.
361. MODERN NETWORK SYNTHESIS. 3 hr. PR: E.E. 325. A study of the basic methods of modern network synthesis with applications to communications and automatic control systems. 3 hr. rec.
365. NOISE THEORY. 3 hr. PR: Consent. A study of methods of solving noise problems in communications and automatic control. 3 hr. rec.
386. SERVOMECHANISMS. 3 hr. PR: E.E. 286 or consent. An advanced study of the analysis and synthesis of servo-control circuits. 3 hr. rec.
387. SAMPLED-DATA CONTROL SYSTEMS. 3 hr. PR: E.E. 386 or consent. A study of control systems in which the activating signal is represented by samples at regular time intervals. 3 hr. rec.
397. RESEARCH. 1-6 hr. Advanced research or special investigations on some topic related to electrical engineering.

INDUSTRIAL ENGINEERING

MASTER OF SCIENCE IN INDUSTRIAL ENGINEERING

Students must comply with rules and regulations as outlined in General Requirements for graduate work in the College of Engineering.

The M.S.I.E. degree program is designed to serve the graduate needs of a person holding a B.S.I.E. degree or an Industrial Engineering option in another field of engineering. Also, a person holding a degree in another field of engineering but who is willing to essentially fulfill the requirements of a B.S.I.E. degree may elect to pursue the M.S.I.E. degree. A review of the aims and objectives of each individual will permit exact evaluation of the courses required.

There are five core areas of study available:

- Core I: Systems and controls
- Core II: Operations Research and Statistical Analysis
- Core III: Production and Methods Planning
- Core IV: Manufacturing Processing and Tooling
- Core V: General Industrial Engineering

Courses. No rigid curriculum is set up for the M.S.I.E. or M.S. degrees. At least half of the 30 hours required for either degree must be in courses in the Department of Industrial Engineering. At least 12 hours must be courses included in the particular core area chosen. (Exception: In Core Area V, at least half of the 30 hours must be in the 300 number series.) A minor may be selected in another core area, in another branch of engineering, in mathematics, or in the College of Commerce.

Thesis. A thesis is required of all candidates for either degree and in practically all cases it will be necessary to take all of the six hours of research work (I.E. 397). A thesis, however, is not automatically approved after the required number of semester hours of research work has been completed. The thesis must be presented in a form that conforms to the general requirements of the Graduate School, and in addition must conform to the additional thesis requirements of the department.

Thesis Supervisor. Each student will be assigned to a thesis supervisor who will normally serve as chairman of his Examining and Advisory Committee.

Final Examination. On completion of his thesis and course work, the candidate will be given an oral examination by his Examining and Advisory Committee; additional examiners may be called in for this examination.

I.E.

- 200. METAL-CUTTING THEORY AND PRACTICE. 3 hr. PR: I.E. 100, and Ch.E. 250. Metal-cutting tools, tool materials, work materials, cutting fluids, process of chip formation, cutting forces, tool-life tests, economic tool life, measurement of product. 2 hr. rec., 3 hr. lab.
- 211. INDUSTRIAL ENGINEERING PROBLEMS. 1-3 hr. PR: I.E. 140 and Senior standing. Special problems relating to industrial engineering.
- 214. ADVANCED ANALYSIS OF ENGINEERING DATA. 3 hr. PR: I.E. 244. The application of advanced theories of statistical techniques to analyze and interpret industrial problems. Subjects include multiple regression, curvilinear regression, advanced analysis of variance, randomized complete blocks, Latin square designs, factorial designs, transformations, and analysis of response curves. Accent is on proper design of experiments, proper interpretation of results, and thorough consideration of all errors of estimation and errors of inference. 3 hr. rec.
- 215. STATISTICAL DECISION MAKING. 3 hr. PR: I.E. 244 or consent. Probability relating to decision processes and essential logic in the applications of statistics and how management can recognize situations in which it will be profitable to employ them. 3 hr. rec.
- 240. MOTION AND TIME STUDY. 3 hr. PR: Junior standing; not for industrial engineering students. Principal aims and applications of time and motion

- study; job analysis; standardizations, use of stop watch, micro-motion analysis, operation and methods analysis. 2 hr. rec., 3 hr. lab.
244. ENGINEERING STATISTICS. 3 hr. PR: Math. 108. The use of graphical analysis; measures of central tendency and dispersion; normal, binominal, and Poisson distributions in engineering applications; linear regression and correlation; tests of significance, non-parametric statistics and analysis of variance. 3 hr. rec.
 250. ELECTRONIC COMPUTER DATA PROCESSING. 3 hr. PR: Senior Engineering status. Elements of number systems. Fundamentals of digital computer operations, equipment characteristics, input and output components. Emphasis is placed on integrated systems analysis and design, business and industrial data for computer applications, and techniques of programming. Existing equipment systems, and economics of their application will be reviewed. 3 hr. rec.
 254. INTRODUCTION TO OPERATIONS RESEARCH. 3 hr. PR: I.E. 142 and 151 or consent of instructor. Economic problems of production management; schematic models; linear programming; total value analysis; incremental analysis; Monte Carlo analysis; and equipment investment analysis. 3 hr. rec.
 286. ENGINEERING ECONOMY. 2 hr. PR: T.A.M. 102. Comparison of the relative economy of engineering alternatives; compound interest in relation to calculation of annual costs; present worth and prospective rates of return on investment; increment costs, sunk costs and the economy of equipment replacement. 2 hr. rec.
 287. ENGINEERING ECONOMY. 3 hr. PR: T.A.M. 102. Comparison of the relative economy of engineering alternatives; compound interest in relation to calculation of annual costs; present worth and prospective rates of return on investments; methods of depreciation, sunk costs, increment costs; general economy studies with emphasis on retirement and replacement of equipment; consideration of taxes, public works, and manufacturing costs as related to economic solution of engineering proposals. 3 hr. rec.
 288. JOB EVALUATION AND WAGE INCENTIVES. 2 hr. PR: I.E. 140 or consent. Principles used in evaluating jobs, rates of pay, characteristics and objectives of wage incentive plans; incentive formulae and curves. 2 hr. rec.
 290. INDUSTRIAL STATISTICS. 2 hr. PR: I.E. 244. Economic objectives of quality control in manufacturing through sampling methods; the Shewhart control chart for variable attributes and defects per unit; statistical approach to acceptance procedures. 2 hr. rec.
 292. PLANT LAYOUT AND DESIGN. 3 hr. PR: I.E. 142. Problems in industrial plant design, equipment location, space utilization, layout for operation and control; flow sheets; materials handling, allied topics in power utilization, light, heat and ventilation.
 294. STANDARD MANUFACTURING COSTS. 3 hr. PR: I.E. 151. Development of standards for labor, material, and overhead expenses; uses of standards for control, analysis of variance between standard and actual costs. 3 hr. rec.
 300. ADVANCED METAL CUTTING THEORY AND PRACTICE. 3 hr. PR: I.E. 200. The development of metal-cutting as a science through research, cutting-fluid theory, machinability of materials, tool materials, hot machining, tool life tests, economics of machining. 2 hr. rec., 3 hr. lab.
 311. SEMINAR. 1-3 hr. PR: Consent. Discussion of research in Industrial Engineering and special problems.
 315. MANAGEMENT CONTROL. 3 hr. PR: I.E. 151 or consent. A study of effective techniques for higher management control; a study of integrated and related control data to aid in establishing a preconceived goal. 3 hr. rec.
 344. ADVANCED DESIGN OF INDUSTRIAL EXPERIMENTS. 3 hr. PR: I.E. 214. A study of several of the more complex statistical methods including sequential analysis,

analysis of covariance, multiple range tests, transformation of data, large factorial experiments, confounding, fractional replication, split-plot designs, lattice designs with one and two restrictions on treatment allocation, with special emphasis on the power, relative efficiency, and interpretation of these designs.

350. QUEUEING THEORY. 3 hr. PR: I.E. 244. Best operating conditions for systems involving waiting times. Elements of stochastic processes. Single-channel and multichannel models. Computational methods, including Monte Carlo techniques. Applications to problems such as Maintenance and Inventory Control. 3 hr. rec.
351. THEORY OF LINEAR PROGRAMMING. 3 hr. PR: Math. 108 and I.E. 244. Extreme point solutions and their generation. Development of the simplex procedure. Duality problems in linear programming. Revised simplex procedures. Degeneracy procedures. Transportation problems. Selected topics related to linear programming. 3 hr. rec.
361. METHODS ANALYSIS AND WORK SIMPLIFICATION. 3 hr. PR: I.E. 140, 286. An advanced study of the techniques of methods analysis, including modern means of methods research. Development of appropriate cost analyses to accompany improved operating plans. A study of the design, installation, and administration of work simplification programs, suggestion systems, and remuneration policies, and the means of intra-plant communications concerning such programs. 2 hr. rec., 3 hr. lab.
370. THEORY OF INDUSTRIAL ENGINEERING AND ORGANIZATION. 3 hr. PR: Graduate standing and consent of instructor. History and development of scientific management in industry starting with early works of Taylor, Gilbreth and Grant, to the present time. 3 hr. rec.
371. METHODS ANALYSIS. 2 hr. PR: I.E. 140 or 240. An advanced study of the technique of methods analysis as an effective means of methods improvement and cost reduction. 2 hr. rec.
372. ADVANCED TIME STUDY. 3 hr. PR: I.E. 140. Review of the various investigations which have been made, with special consideration given to the development of these studies into new fields. 3 hr. rec.
373. BUDGET CONTROL. 3 hr. PR: I.E. 294. Principles involved in the preparation of budgets by financial divisions and the application of divisional budgets as control media. 3 hr. rec.
374. ADVANCED ENGINEERING ECONOMY. 3 hr. PR: I.E. 286 or 287. Special emphasis on depreciation, engineering and economic aspects of selection and replacement of equipment; relationship of technical economy to income taxation and load factor and capacity to economy. 3 hr. rec.
380. INTEGRATED DATA PROCESSING. 3 hr. PR: I.E. 250 and consent of instructor. Advanced work in electronic data-processing systems and procedures design. Case studies of integrated data-processing systems. Course projects will include individual use of a computer in management data-processing analysis problems. 3 hr. rec.
381. DIGITAL COMPUTER APPLICATIONS. 1 hr. PR: Graduate standing in Engineering, Physical Science, or Mathematics. Introduction to methods of digital computation and study of the programming process with emphasis on coding with an automatic programming language for scientific problems (FORTRAN). The student will have considerable opportunity to analyze engineering and scientific problems using the facilities available at the University Data Processing Center. 2 hr. rec., 3 hr. lab. (for a period of 5 weeks).
390. ADVANCED INDUSTRIAL STATISTICS. 3 hr. PR: I.E. 290. Advanced study of 10 percent-, single-, double-, and sequential-sampling procedures, problems of application of statistical quality control methods in industries. 3 hr. rec.

397. RESEARCH. 1-6 hr. Investigation or original research on some special topic relating to industrial engineering.

MECHANICAL ENGINEERING

MASTER OF SCIENCE IN MECHANICAL ENGINEERING

Students must comply with rules and regulations as outlined in General Requirements for graduate work in the College of Engineering. In addition, a graduate student in the Department of Mechanical Engineering must comply with departmental requirements outlined below:

Thesis. A thesis is required, except in unusual circumstances, of all candidates for the Master of Science Degree in Mechanical Engineering.

Courses. No rigid curriculum is set up for the M.S.M.E. Degree; however, the following grouping of courses is given as a guide for selecting a graduate program.

In general, at least half of the hours required for the degree should be in courses in the 300 series.

Group I. *Required of all candidates.** Hr.

Math. 254. Advanced course in Applied Mathematics	3
OR	
Two 200 level Math. courses	6
M.E. 397. Research	6

Group II. *A minimum of 12 credit hours required.* Hr.

M.E. 202. Engineering Analysis and Design	3
M.E. 204. Mechanical Vibrations	3
M.E. 205. Advanced Kinematics	3
M.E. 230. Heat Transmission	3
M.E. 231. Introduction to Gas Dynamics	3
M.E. 260. Introduction to Engineering Systems Analysis	3
M.E. 265. Engineering Acoustics	3
M.E. 271. Fluid Power Control	3
M.E. 300. Seminar	1-3
M.E. 303. Advanced Machine Design	3
M.E. 320. Advanced Thermodynamics I	3
M.E. 321. Advanced Thermodynamics II	3
M.E. 330. Advanced Heat Transfer	3
M.E. 331. Advanced Heat Transfer	3
M.E. 351. Advanced Combustion Engines	3
M.E. 352. Turbomachinery	3
M.E. 354. Advanced Refrigeration	3
M.E. 360. Engineering Similitudes	3

Group III. Hr.

T.A.M. 200. Advanced Mechanics of Materials	3
T.A.M. 309. Statistical Applications in Mechanics	3
T.A.M. 310. Applied Mechanics of Materials	3
T.A.M. 312. Inelastic Behavior of Materials	3
T.A.M. 320. Theory of Elasticity	3
T.A.M. 340. Photoelasticity	3
Phys. 225. Introduction to Modern Physics	3
Phys. 226. Introduction to Modern Physics	3
Ch.E. 248. Statistical Design of Experiments	2
Ch.E. 290. Introduction to Nuclear Engineering	3
Any course recommended by Advisory Committee	Variable Credit

*Candidates already having credit for Math. 254 must enroll in courses from either Group II or Group III in order to meet the minimum hours required. Students doing non-thesis or non-problem degrees must enroll in courses from Group II or Group III in order to meet the minimum hours required.

M.E.

201. DESIGN OF MACHINE MEMBERS. 3 hr. PR: T.A.M. 103 and M.E. 112 or consent. Analysis and design of machine members based on the theory of strength of materials and its modifications due to manufacturing processes and economic considerations. Emphasis is on rational methods and the development of judgment in the design. 1 hr. rec., 6 hr. lab.
202. ENGINEERING ANALYSIS AND DESIGN. 3 hr. PR: M.E. 201 and consent. Use of fundamental principles of mathematics, statics, physics, mechanics, thermodynamics, and heat transfer in the rigorous analysis of engineering problems. Determination of the critical specifications of the problem solution and the use of a creative approach to the satisfaction of these critical specifications in a workable system. 2 hr. rec., 3 hr. lab.
203. MACHINE DESIGN. 3 hr. PR: M.E. 201. Design of complete machines to perform given functions. Creative design is encouraged to provide new ideas. Final designs are selected to perform the function, be economical and easy to fabricate, and have a generally pleasing appearance. 1 hr. rec., 6 hr. lab.
204. MECHANICAL VIBRATIONS. 3 hr. PR: Math. 253 and T.A.M. 104 or consent. Fundamentals of vibration theory. Free and forced vibration of one, two and multiple degree of freedom systems, transient analysis. Solution by Fourier and Laplace Transformation. Methods of Rayleigh, Holzer and Stodola. Conservative systems and LaGrange's equation. 3 hr. rec.
205. KINEMATICS. 3 hr. PR: M.E. 112 and Math. 253, or consent. Geometry of constrained motion, kinematic synthesis and design, spacial linkages. Coupler curves, inflection circle Euler-Savary equation, cubic of stationary curvature and finite displacement techniques. 3 hr. rec.
223. POWER PLANTS. 3 hr. PR: M.E. 125. Principles of design and operation of modern steam power plants for central stations and for process industries. Each student submits an individual design problem. 3 hr. rec.
224. STEAM TURBINES. 3 hr. PR: M.E. 125. The theory of fluid dynamics and the thermodynamics of the modern turbines; materials, construction details and design of important elements; influences on economy of variations in cycles and operative ranges. 3 hr. rec.
229. INTERNAL COMBUSTION ENGINES. 3 hr. PR: M.E. 121 or M.E. 125. The thermodynamics of the internal combustion engines; Otto cycle; Diesel cycle; two- and four-cycle engines, fuels, carburetion and fuel injection; combustion; engine performance, supercharging. 3 hr. rec.
230. HEAT TRANSFER I. 3 hr. PR: M.E. 120 or M.E. 121. Steady state and transient conduction, including extended surface and numerical methods, emphasizing both forward and backward time step methods. Thermal radiation including radiation functions and radiation network theory. Boundary layer equations and forced and free convection are also covered. 3 hr. rec.
231. INTRODUCTION TO GAS DYNAMICS. 3 hr. PR: M.E. 125 or M.E. 121, Math. 240 and Math 253. The basic fundamentals of gas dynamics, one-dimensional gas dynamics and wave motion, methods of measurement, effect of viscosity and conductivity, and concepts from gas kinetics. 3 hr. rec.
235. HEAT TRANSFER II. 3 hr. PR: M.E. 230. A continuation of M.E. 230, covering nonlinear extended surface; gas radiation; freezing; heat exchanger theory; recovery factor and high speed flow; and mass transfer. Also, periodic flow and application of the digital computer to problems in heat transfer. 3 hr. rec.
250. HEATING, VENTILATING, AND AIR CONDITIONING. 3 hr. PR: M.E. 125 or consent. Methods and systems of heating, ventilating, and air conditioning of various types of buildings, types of controls and their application. 3 hr. rec.

260. **INTRODUCTORY ENGINEERING SYSTEMS ANALYSIS.** 3 hr. PR: Senior standing. A study of analogous and mixed systems. Similitude of mechanical, electrical, and acoustic dynamic systems. Dimensional analysis and theory of model design. 3 hr. rec.
265. **ENGINEERING ACOUSTICS.** 3 hr. PR: Math. 253 and consent. Use of fundamental principles of mathematics and physics to develop the basic theories of sound. Application of these theories involving sound in closed areas, the various modes of sound transmission, noise control and psychoacoustic criteria. 3 hr. rec.
271. **FLUID POWER CONTROL.** 3 hr. PR: M.E. 125 or M.E. 121 and C.E. 115 or conc: C.E. 115. Use of fundamental properties of fluids and fluid flow in the operation of power control systems. The theory and design of hydraulic and air operated control components with special emphasis on automatic circuits. 3 hr. rec.
280. **MECHANICAL PROBLEMS.** 1-6 hr. For junior, senior, and graduate students.
300. **SEMINAR.** 1-3 hr. PR: Consent. Discussion, library readings, and individual study reports in the mechanical engineering field.
303. **ADVANCED MACHINE DESIGN.** 3 hr. PR: M.E. 203. Stresses in indeterminate machine parts, experimental stress analysis. Design for high temperatures, pressures and speeds. Bearings and lubrication. Rotating discs and elastic stability and high speeds. Residual stresses and creep. 3 hr. rec.
320. **ADVANCED THERMODYNAMICS.** 3 hr. PR: M.E. 125. Definitions and scope of thermodynamics. First and Second laws, Maxwell's relation, Calpeyron relations, equation of state, thermodynamics of reactive systems, availability.
321. **ADVANCED THERMODYNAMICS II.** 3 hr. PR: M.E. 320 or consent. Methods of statistical mechanics; concept of temperature; perfect diatomic gases and crystalline solids, Jacobian equations of thermodynamics; grand potential function; inherently irreversible processes.
330. **ADVANCED HEAT TRANSFER.** 3 hr. PR: M.E. 230 or consent. Analytical and application treatment of steady state and transient conduction, including internal generation, integral equation forms, numerical solutions and minimum weight fin theory. Boundary layer theory of forced convection, Nusselt film theory of condensation and boiling theory.
331. **ADVANCED HEAT TRANSFER.** 3 hr. PR: M.E. 330 or consent. Continuation of M.E. 330. Thermal radiation theory and application in addition to measurement errors and techniques. Topics covered will be radiation network theory, radiation functions and theory of emissivity. Some time is allowed for modern developments in heat transfer including the solution of heat transfer problems on digital computers.
351. **ADVANCED INTERNAL COMBUSTION ENGINES.** 3 hr. PR: M.E. 229 or consent. Combustion in spark ignition engines; compression ignition engines; detonation; fuel-air ratios; heat losses; lubrication; efficiencies; two-stroke engines; four-stroke engines; performance, exhaust turbines; gas turbines. 3 hr. rec.
352. **TURBOMACHINERY.** 3 hr. PR: M.E. 121 or M.E. 125. A study of flow problems encountered in the design of water, gas and steam turbines, centrifugal and axial flow pumps and compressors, design parameters.
354. **ADVANCED REFRIGERATION.** 3 hr. PR: M.E. 250. Thermodynamics of vapor cycles, refrigerants, fluid flow, heat transfer, psychometrics, types of refrigeration and equipment required, application of refrigeration in industry, food preservation. 3 hr. rec.
360. **ENGINEERING SIMILITUDES.** 3 hr. PR: Consent. Development of the dimensional analysis concepts and techniques and their application in model

design. Rational approach to the design of distorted models. Study of analogies from a standpoint of model-prototype relations. 3 hr. rec.

397. RESEARCH. 1-10 hr. Investigation or original research on some topic relating to mechanical engineering.

THEORETICAL AND APPLIED MECHANICS

MASTER OF SCIENCE IN THEORETICAL AND APPLIED MECHANICS

Students must comply with rules and regulations as outlined in General Requirements for graduate work in the College of Engineering.

Courses. At least 30 semester hours are required for the degree of Master of Science in Theoretical and Applied Mechanics. At last 12 of these hours, exclusive of thesis, must be in the Department of Theoretical and Applied Mechanics. As many courses as are possible should be in the 300 series. A minor in one of the other branches of engineering, physics, or mathematics is recommended.

Thesis. A thesis is required of all candidates for the degree of Master of Science in Theoretical and Applied Mechanics, and is ordinarily for 6 hours credit. The thesis will be accepted only after approval by the thesis committee. The thesis must conform to the general requirements of the Graduate School and to the additional requirements of the Department.

Thesis Supervisor. Each student will be assigned a thesis supervisor who will serve as chairman of his thesis committee.

Final Examination. On completion of his thesis, the candidate for the degree of Master of Science in Theoretical and Applied Mechanics will be given an oral examination by his thesis committee. Additional examiners may be called in for this examination.

THE DEGREE OF DOCTOR OF PHILOSOPHY

Graduate students electing Theoretical and Applied Mechanics as their major must have had the equivalent of the undergraduate courses in mechanics required for a bachelor's degree in any of the curricula in the College of Engineering.

A graduate student who has received a master's degree from a school which has an undergraduate curriculum in the area of his master's degree accredited by E.C.P.D. may pursue a Ph.D. degree in Theoretical and Applied Mechanics if he meets the other requirements of the Department.

Candidates for the doctor of philosophy degree, regardless of their specific major, must attain a proficiency in each of the following areas: (1) mechanics of solids, (2) mechanics of fluids, (3) dynamics, (4) experimental mechanics, and (5) applied mathematics.

T.A.M.

200. ADVANCED MECHANICS OF MATERIALS I. 3 hr. PR: T.A.M. 103 or consent. Energy methods; localized stresses; curved flexural members; torsion of non-circular sections; thick-walled cylinders and rotating disks; contact stresses.
201. THEORY AND APPLICATION OF OSCILLATORY PHENOMENA. 3 hr. PR: T.A.M. 104. Study of oscillations or vibrations in acoustical, electrical, hydraulic and mechanical systems. 3 hr. rec.
202. ADVANCED MATERIALS LABORATORY. 2-4 hr. PR: T.A.M. 103. Continuation of T.A.M. 103 with emphasis on a selected problem or problems.
203. EXPERIMENTAL STRESS ANALYSIS. 3 hr. PR: T.A.M. 103, 104. Introduction to some of the more common experimental methods of analyzing stress distributions. Photoelasticity, brittle lacquers, birefringent coatings, strain gage techniques and instrumentation, as applied to problems involving static, dynamic and residual stress distributions. 2 hr. rec., 3 hr. lab.
210. CONTINUUM MECHANICS. 3 hr. PR: Undergraduate mechanics and Math. 253. A course designed to emphasize the basic laws of physical behavior of con-

- tinuous media. Course content to include: analysis of stress; equations of motion and boundary conditions; kinematic analysis; rates of strain, dilatation and rotation; bulk time, rates of change; constitutive equations with special attention to elastic bodies and ideal fluids; energy equations and the first law of thermodynamics.
250. INTERMEDIATE DYNAMICS. 3 hr. PR: Math. 253, T.A.M. 104. Mechanics of a particle; curvilinear coordinates, geometry of space curves, moving reference frames, generalized coordinates. Dynamical principles; D'Alembert's principle, principle of virtual work, Lagrange's equations, variational formulation of Hamilton's principle. Simple non-linear systems. 3 hr. rec.
 280. SPECIAL PROBLEMS IN MECHANICS. 1-3 hr. PR: T.A.M. 103 and consent For junior, senior, and graduate students.
 302. ANALYTICAL METHODS IN ENGINEERING. 3 hr. PR: Math. 253 or consent. A course designed to provide training in the applications of mathematical analysis to engineering problems. Course content to include: index notation; determinant, matrices, and quadratic forms; linear transformations, eigen-value problems; complex variables; analytic functions, Taylor and Laurent expansions, residue theory, applications of conformal mapping; ordinary linear differential equations in the complex plane, existence and uniqueness theories, series solution for regular and irregular singularities, Legendre and Bessel equation, integral solutions. 3 hr. rec.
 303. ANALYTICAL METHODS IN ENGINEERING. 3 hr. PR: T.A.M. 302 or consent. Continuation of T.A.M. 302. Course content to include: partial differential equations, method of characteristics, initial and boundary conditions; Dirichlet, Neumann, vibrating string, and other related problems; calculus of variations, stationary values of functions and functionals, Euler equations and boundary conditions, Lagrange multipliers, second variation for maximum problems, applications such as Hamilton's principle, linear integral equations, equations of the first and second kind, solution by successive substitution and approximation, eigen-values and eigen-functions, Fredholm theory, applications. 3 hr. rec.
 310. ADVANCED MECHANICS OF MATERIALS II. 3 hr. PR: Consent. Membrane stresses in shells; bending of flat plates; two-dimensional elasticity; beams on elastic supports.
 312. INELASTIC BEHAVIOR OF ENGINEERING MATERIALS. 3 hr. PR: T.A.M. 200. Rheological aspects of inelastic behavior; inelastic load-stress relationship for members subjected to axial, bending, torsion and buckling loads. Analytical stress-strain relationship and use of Ramberg-Osgood parameters. Combined loading, interaction curves and their use. Statistically indeterminate members loaded inelastically; inelastic buckling theory.
 314. THEORY OF BUCKLING. 3 hr. PR: Math. 253, T.A.M. 316. Fundamental theorems for the investigation of stability of mechanical systems. Application to discrete systems and development of stability equations for elastic bodies. 3 hr. rec.
 316. ENERGY METHODS IN APPLIED MECHANICS. 3 hr. PR: Math. 253, T.A.M. 200 and T.A.M. 310 desirable. Introduction to variational principles of mechanics and applications to engineering problems; principle of virtual displacements, principle of minimum potential energy, principle of complementary energy, Castigliano's theorem, Hamilton's principle. Applications of energy principles to stress analysis of frames, rings, curved beams, elastic plates. 3 hr. rec.
 320. THEORY OF ELASTICITY I. 3 hr. PR: Math. 253 or consent. A basic solid mechanics course to include: Cartesian tensors; equations of classical elasticity, energy, minimum, and uniqueness theorems for the first and second boundary value problems; St. Venant principle; extension, torsion, and bending problems. 3 hr. rec.

321. **THEORY OF ELASTICITY II.** 3 hr. PR: T.A.M. 320. Continuation of T.A.M. 320 with course content to include: generalized tensors; equations of finite elasticity; equations of classical elasticity in generalized coordinates; complex variables and potentials; plane stress and strain; various special problems. 3 hr. rec.
324. **THEORY OF THIN SHELLS.** 3 hr. PR: Math. 240 or 253 and 254 or equiv., T.A.M. 321, 314. Theoretical basis for analysis of shell-type structures. Material includes differential geometry of surfaces, current shell theories; and stability criteria. 3 hr. rec.
330. **INSTRUMENTATION IN ENGINEERING.** 3 hr. PR: T.A.M. 104 or equiv. Theory of measuring instruments, with emphasis on dynamic, as opposed to static or slowly changing, measurements of force, pressure, displacement, vibration, temperature, etc. Also, selection of instruments for specific purposes. 2 hr. rec., 3 hr. lab.
340. **PHOTOELASTICITY.** 3 hr. PR: T.A.M. 200, 203. Theory of optics, birefringence, stress-optic law, polariscope, compensation. Techniques of model making, photography, polariscope use. Data interpretation by various methods including principal stress separation by shear difference and graphical integration. 2 hr. rec., 3 hr. lab.
350. **ADVANCED DYNAMICS I.** 3 hr. PR: T.A.M. 250. Continuation of T.A.M. 250. Mechanics of a system of particles; mechanics of rigid bodies; theory of moments of inertia, angular momentum and kinetic energy, Poinso't's interpretation of torque-free motion, Euler's angles, Euler's dynamical equations, pitch, roll, yaw, spinning top, gyroscopes, etc.
351. **ADVANCED DYNAMICS II.** 3 hr. PR: Math. 254 or equiv. Dynamics of continuous solids. Wave motion; study of string motion in detail in order to introduce methods for attacking more general problems, vibration of beams, membranes and plates. Stress propagation in unlimited solids; dilatational, distortional, and surface waves.
380. **ADVANCED INDEPENDENT STUDY.** 1-3 hr. PR: T.A.M. 200, 203, Math. 253 or 254. Individual investigation, either analytical or experimental, in one or more phases of advanced mechanics.
397. **RESEARCH.** 1-6 hr. Advanced research or special investigations on some topic related to mechanics.

MINES

The School of Mines offers graduate curricula leading to the Master of Science in Engineering of Mines degree in two mining engineering fields—the mining engineering option and the petroleum and geological engineering option. A student desiring to take courses for graduate credit in the School of Mines must first comply with the appropriate regulations of the Graduate School.

After admission to the Graduate School, a student desiring to become a candidate for a graduate degree must apply for admission to the School of Mines in the major option of his choice.

An applicant with a baccalaureate degree or its equivalent in the major field corresponding to the graduate study desired, from a department accredited by the Engineers' Council for Professional Development, will be admitted on the same basis as graduates of West Virginia University. Lacking these qualifications, an applicant must first fulfill the School of Mines requirements in the field in which he is seeking an advanced degree.

Approval for candidacy for a graduate degree by faculty action is required to establish eligibility for a degree. A graduate student may request approval by formal application after completing a minimum of 12 semester hours of graduate courses with a grade-point average of at least 3.0 (B) based on all graduate courses in residence for which final grades have been recorded.

Academic Standards. No credits are acceptable toward an advanced degree which are reported with a grade lower than "C." To qualify for an advanced degree, a graduate student must have a grade-point average of at least 3.0 based on all courses completed in residence for graduate credit. Each candidate for a degree must select a major subject and submit a thesis showing marked attainment in that field.

201. OIL FIELD DEVELOPMENT. I. 2 hr. PR: Physics 112, Math. 4 and Geol. 3. Introduction to principles, equipment, and methods applied to development of an oil property. 2 hr. rec. Mr. Wasson
203. PETROLEUM PROPERTY VALUATION AND MANAGEMENT. II. 2 hr. PR: E.M. 204. Petroleum property valuation and acquisition; economic, governmental and social aspects of management of oil and gas properties. 2 hr. rec. Mr. Wasson
204. OIL AND GAS PRODUCTION. II. 4 hr. PR: E.M. 201. Continuation of E.M. 201 with core analysis, drilling mud testing, and oil testing laboratory. 3 hr. rec. 3 hr. lab. Mr. Wasson
205. GAS MEASUREMENT ENGINEERING. II. 2 hr. PR: E.M. 201 and C.E. 115. Methods of commercial gas measurement and pressure regulation with a laboratory devoted to use of various types of equipment. 1 hr. rec., 3 hr. lab. Mr. Laird
207. INTRODUCTORY SEISMOLOGY. I, II. 1 hr. PR: Physics 112. Earthquakes and their causes and area distribution; theory of elastic waves; the principles of seismograph construction, adjustment, and operation; interpretation and calculation of seismograms with exercises provided by records of the University seismograph station. 1 hr. rec. Mr. Laird
208. GEOLOGICAL SURVEYING. II. 1 hr. PR: E.M. 103 and Geol. 161. Topographic mapping with the plane table. 3 hr. field. Mr. Laird
209. MINERAL PREPARATION. I, II. 2 hr. PR: E.M. 212 and T.A.M. 104 or consent. Principles of preparation, beneficiation and concentration of metallic and non-metallic ores for further processing or utilization. Not open to students with credit in E.M. 217. 2 hr. rec. Mr. Sandy
210. MINERAL PREPARATION LABORATORY. I, II. 1 hr. PR: E.M. 209 or concurrent registration in E.M. 209. Laboratory exercises and practice in sampling, screen analyses, float and sink separation, assembly and interpretation of test data, and the use of various types of beneficiation equipment. 3 hr. lab. Mr. Sandy
212. ADVANCED MINING. II. 3 hr. PR: E.M. 111 and E.E. 105. Engineering principles, methods and equipment applied to mine transportation, hoisting, and drainage. 3 hr. rec. Mr. McClung
213. MINE VENTILATION. I. 3 hr. PR: E.M. 107 and T.A.M. 104. Principles, purposes, methods and equipment pertaining to the ventilation of mines. 2 hr. rec., 3 hr. lab. Staff
214. MINE VALUATION, COST CONTROL, AND ECONOMICS. I, II. 3 hr. PR: Econ. 2 and E.M. 107 or consent. Mineral property evaluation, sampling and estimation of mineral deposits, capitalized costs in mining and recovery of investment, analysis of mining costs, cost control and time analysis of mining operations. 3 hr. rec. Mr. Sandy
215. INDUSTRIAL SAFETY ENGINEERING. I, II. 2 hr. PR: Junior standing. Analysis of problems of industrial safety and accident prevention, laws pertaining to industrial safety and health, compensation plans and laws, and industrial property protection. 2 hr. rec. Mr. Sandy
216. PETROLEUM ENGINEERING DESIGN. I. 2 hr. PR: E.M. 204. Structural and machine analysis and design as related to the production and transportation of oil and natural gas. Two 3 hr. labs. Mr. Laird
217. COAL PREPARATION. I, II. 3 hr. PR: E.M. 212, and T.A.M. 104. Principles of preparation and beneficiation of coal marketing, with laboratory devoted

- to sampling, screen analyses, float and sink separation, and use of various types of coal-cleaning equipment. 2 hr. rec., two 3 hr. labs. Mr. Sandy
218. ADVANCED MINERAL PREPARATION. I, II. 3 hr. PR: E.M. 217. The theory and practice of concentrating ores and industrial minerals with special consideration to the more recent advances in the beneficiation of both ores and coal. 2 hr. rec., 3 hr. lab. Mr. Sandy
 219. ADVANCED MINING METHODS FOR VEIN DEPOSITS. I, II. 3 hr. PR: E.M. 107, T.A.M. 104. Methods and systems of mining other than flat seams. Emphasis placed on selection of methods in relation to cohesive strength of ore bodies and their enclosing wall rocks. Mining of anthracite seams included. 3 hr. rec. Mr. Sandy
 220. MINE DESIGN. I, II. 2 hr. PR: E.M. 212 and registration in C.E. 122. Design of an underground mining development with full report. Two 3 hr. labs. Mr. McClung
 221. MINE DESIGN. I, II. 2 hr. PR: E.M. 220. Continuation of E.M. 220 including design of preparation plant and loading facilities with full report covering plan, equipment, operation, and costs. Two 3 hr. labs. Mr. Sandy
 222. MINE EQUIPMENT AND MACHINERY. I, II. 3 hr. PR: E.E. 105 and E.M. 212. Selection, installation, operation, and maintenance of mining equipment. 3 hr. rec. Mr. McClung
 223. MINE MANAGEMENT. II. 3 hr. PR: E.M. 212 and senior standing. Economic, governmental, social, and labor aspects of mining as related to the management of a mining enterprise. 3 hr. rec. Staff
 224. MINING ENGINEERING PROBLEMS. I, II. 1 to 6 hr. PR: Senior or graduate standing. Investigation and detailed report on a special problem in mining engineering related to coal mining, mineral mining, or geological, petroleum, and natural gas engineering. Supervision and guidance by a member of the graduate faculty. Staff
 227. MINE POWER APPLICATIONS. I. 2 hr. PR: E.M. 222 or consent. Underground transmission systems, electrical controls for mining machinery, alternating current applications in coal mining, power costs and safety features. 2 hr. rec. Mr. McClung
 228. MINE EQUIPMENT AND MACHINERY CONTROLS. II. 3 hr. PR: E.M. 227 or consent. Principles, application and use of electric and hydraulic devices and circuits for protection and control of mine machinery and equipment. 3 hr. rec. Mr. McClung
 229. ADVANCED MINING EQUIPMENT APPLICATIONS. I. 3 hr. PR: E.M. 222. Structural, mechanical, hydraulic and electrical characteristics of the more common items of mining equipment. Controls, electrical and hydraulic circuits, and mechanical transmission with associated problems. Laboratory design of a control system for a mining machine. 2 hr. rec., 3 hr. lab. Mr. McClung
 230. ELEMENTS OF GEOPHYSICAL PROSPECTING. I. 3 hr. PR: Geol. 151, Physics 112. Principles, calculations and application of methods for locating subsurface oil, gas and mineral deposits. 3 hr. rec. Mr. Laird
 231. GEOPHYSICAL PROSPECTING LABORATORY. I. 1 hr. PR: E.M. 230 or concurrent registration in E.M. 230. Field and laboratory use of instruments used in geophysical prospecting. 3 hr. lab and field. Mr. Laird
 232. PETROLEUM RESERVOIR ENGINEERING. I. 3 hr. PR: E.M. 204, E.M. 236. Concepts and applications of properties of rocks and rock-fluid systems which are fundamental to engineering analysis of petroleum reservoirs. 3 hr. rec. Mr. Wasson
 233. THEORY AND PRACTICE OF COAL PREPARATION. SI. 4 hr. PR: Physics 112, Math. 108, or consent. Theory of coal beneficiation processes and the design, operation, and control of coal preparation plants. Includes the theory and practice of sampling, crushing, sizing, cleaning, and drying of coal, the operation and maintenance of coal washing and auxiliary equipment,

materials handling, plant efficiencies and quality control. The laboratory work consists principally of the determination of the cleanability characteristics of coal, interpretation of gravity separation data, chemical analysis, and the operation of typical coal washing equipment. Not open to students taking E.M. 217. 4 hr. rec., 4 hr. lab. Mr. Sandy

234. APPLIED GEOPHYSICS. II. 3 hr. PR: Physics 112, Geol. 151, or consent. The application of science of geophysics in prospecting for oil and minerals; and in the location and analysis of earthquakes. 3 hr. rec. Mr. Laird
235. FUNDAMENTALS OF WELL LOGGING. II. 3 hr. PR: Math. 108, E.M. 204, or consent. Principles of the various well logging methods and related calculations, with exercises in interpretation of actual data from actual well logs. 2 hr. rec., 3 hr. lab. Mr. Laird
236. HYDROCARBON PHASE BEHAVIOR. I. 3 hr. PR: Physics 2 or 112 and E.M. 204 or concurrent registration in E.M. 204. The qualitative and quantitative phase behavior of single and multicomponent hydrocarbon systems with emphasis on applications to petroleum production engineering and petroleum reservoir engineering. 2 hr. lec., 3 hr. lab. Mr. Wasson
237. COMPOSITION AND PROPERTIES OF OIL WELL DRILLING FLUIDS. I. 3 hr. PR: E.M. 204 and Chem. 163. Principles of drilling fluid control, including a laboratory for testing procedures and measurement of composition and properties. 2 hr. rec., 3 hr. lab. Mr. Laird
238. OIL AND GAS LAW. II. 2 hr. PR: Consent. Landowner's interest, the oil and gas lease, transfers of interest, conservation laws, contracts, business organization, sales, professional registration, patents. 2 hr. rec. Mr. Wasson
239. ADVANCED PETROLEUM RESERVOIR ENGINEERING. II. 3 hr. PR: E.M. 232. Mechanics of fluid flow in porous media; production by depletion drive, by frontal displacement, by water drive, by segregation drive, secondary recovery. 2 hr. rec. Mr. Wasson
- 301, 302. ADVANCED MINE DESIGN. I, II. Credit arranged. Advanced detail design and layout of coal mine plant, particularly incorporating new ideas of machines and mining methods. Staff
351. COAL MINING. SI. 3 hr. PR: Chemistry, 10 hr.; Physics, 8 hr. and accompanied or preceded by general geology. Especially for students who are planning to teach mining subjects in high school. Not open to students taking E.M. 102, 111, or 212. Hours arranged. Staff
- 395, 396. GRADUATE SEMINAR IN COAL MINE OPERATION AND ADMINISTRATION. I, II. 3-6 hr. PR: B.S. Degree and consent of Committee. Group discussion and analysis of problems related to the production, preparation, marketing, and utilization of coal with special assignments and emphasis in accordance with personal background and field of interest of the individual student. Staff
397. RESEARCH. I, II. Credit arranged. Individual problem in some phase of mining. Carefully prepared report required. Staff

INDUSTRIAL RELATIONS

The degree of Master of Science with a major in Industrial Relations is offered in recognition of the growing need for specialized, interdisciplinary training in this field. The curriculum, drawn from relevant course offerings in a number of colleges, schools, and departments of the University, constitutes an integrated program of study in labor and industrial relations.

The field of industrial relations is not a separate, basic discipline like economics, political science, or sociology. Rather it represents the empirical study and practical application of knowledge gained in all the social sciences to the problem rising out of the employee-employer and union-management relationships.

REQUIREMENTS FOR ADMISSION

In addition to the entrance requirements of the Graduate School, the Institute requires a minimum of 21 hours of undergraduate work in the social sciences including 3 hours in statistics. (The course in statistics may have been taken in economics, psychology or engineering). A minimum grade of "C" is required in each of the courses taken to meet the 21-hour undergraduate credit requirement for admission to the program. The social sciences include economics, history, general social science, political science, psychology, and sociology.

Students are required to take the general aptitude test of the Graduate Record Examination. In certain cases, students will be admitted to the Institute without having taken the test, but they will be required to take it the first time it is offered after admission.

After the Institute has received notice of admission to the Graduate School, a copy of the official transcript of undergraduate work, and the results of the general aptitude test, students will be notified about their admission. Normally, candidates will be admitted to the Institute if they have met the requirements mentioned above and have a 2.5 (B+) grade-point average based upon the last 60 hours of undergraduate work.

Students who meet the general requirements of the Graduate School but not the special course prerequisites of the Institute may register for graduate work, but undergraduate deficiencies must be removed in the first year of residence.

REQUIREMENTS FOR THE DEGREE

The candidate must fulfill the general requirements of the Graduate School and must complete 30 hours of graduate work including:

1. Industrial Relations 330. SEMINAR IN INDUSTRIAL RELATIONS. II. 3 hr. The seminar deals with research methods and an interdisciplinary analysis of problems in industrial relations. The faculty is drawn from a number of separate disciplines.
2. Industrial Relations 340. THESIS IN INDUSTRIAL RELATIONS. I, II, S. 1-6 hr. Total minimum requirement, 6 hours.
3. A minimum of 15 hours chosen from the following courses in industrial relations after consultation with the Director of the Institute. (In general, a student should choose no more than 6 of the required 15 hours in any one subject-matter area.)

<i>Economics</i>	<i>Hr.</i>	<i>Law</i>	<i>Hr.</i>
217. Trade Unionism	3	264. Labor Law	3
218. Col. Barg. and Lab. Rel.	3	<i>Management</i>	
219. Econ. Wages and Lab. Mkt. . .	3	216. Personnel Management	3
<i>Engineering of Mines</i>		<i>Political Science</i>	
215. Indust. Safety Engr.	2	243. Publ. Pers. Adm.	3
<i>History</i>		<i>Psychology</i>	
281. American Lab. Movement	3	214. Job Analysis	3
<i>Industrial Engineering</i>		244. Personnel Psychology	3
240. Motion and Time Study	3	314. Prac. Indust. Interv.	3
288. Job Eval. and Wage Incent. . .	3	<i>Sociology</i>	
370. Theor. Indust. Eng. and Org. .	3	250. Human Rel. in Indust.	3

4. With the consent of the adviser the remaining 6 or more semester hours may be selected from the following courses:

<i>Economics</i>	<i>Hr.</i>	<i>Education</i>	<i>Hr.</i>
210. Comp. Econ. Systems	3	374. Counseling Techniques	2
221. Economic Theory	3	375. Individ. Invt. Techn.	2
235. Business Cycles	3	<i>Journalism</i>	
245. Govt. and Business	3	212. Public Relations	3
256. Advanced Statistics	3		

<i>Management</i>	<i>Hr.</i>	<i>Psychology (Cont'd.)</i>	<i>Hr.</i>
225. Business Policy	3	236. Psychology of Adjustment ...	3
<i>Industrial Engineering</i>		260. Statis. Methods of Psych. ...	3
290. Indust. Statistics	2	386. Rehab. Couns.—problems	
294. Standard Mfg. Costs	3	and Workshop	1 to 3
<i>Political Science</i>		<i>Social Work</i>	
232. Publ. Opinion and Prop.	3	285. Intro. to Publ. Welfare	3
241. Adm. Org. and Man	3	304. Community Relationships ...	3
<i>Psychology</i>		306. The Social Services	3
205. Individual Differences	2	<i>Sociology</i>	
216. Attitudes and Propaganda ...	3	220. Social Change	3
225. Group Psychom. Testing	3	244. Culture and Personality 2 or 3	
229. Abnormal Psychology	3	270. Group Dynamics	3

Limited changes may be made in the curriculum outlined above, with the consent of the Director of the Institute. To be eligible for graduation, graduate students must maintain a 3.0 grade-point average (B) in all graduate courses excluding Industrial Relations 340. A grade of "D" in any course taken while a student in the industrial relations program, whether the course is graduate or undergraduate, inside or outside the program, may be grounds for failure in the program.

THESIS REQUIREMENTS

The student must choose his thesis topic in consultation with the Director. After this approval has been received, the student—with the advice of the Director—shall select a thesis chairman. The student, with the aid of his thesis chairman, shall make his hypothesis and the methodology to be employed explicit.

The final draft of the thesis must be approved by the thesis committee, composed of the thesis chairman and two other faculty members. The Director of the Institute will be a member of every thesis committee; further, no more than two members of a thesis committee may represent the same discipline.

JOURNALISM

The School of Journalism offers work leading to the degree of Master of Science in Journalism.

Purpose of the Degree. The purpose of the degree is to provide the student who already has a sound background in technical and professional journalism education an opportunity to broaden his communications horizons by gaining a critical insight into the theory and practice of the communications industries; the degree also is intended to introduce the student to research methods applicable to communications problems.

Admission. In order to be admitted to the Master of Science in Journalism program, the student must have a baccalaureate degree in journalism from an accredited institution or must have completed a core program in journalism or must demonstrate competency in a minimum number of areas prescribed by the School of Journalism. The prospective student also must have had a 3.0 average in undergraduate Journalism courses.

Requirements. The student will be required to meet the following requirements for the degree:

- Complete a minimum of 30 semester credit hours, including a thesis with a maximum of 6 hours credit.
- At least 18 hours of work, including the thesis, must be taken in the School of Journalism.
- A minor of 8-12 hours credit must be taken outside the School of Journalism.

Examination. On completion of course requirements, the candidate shall be required to pass an oral examination on his thesis and on his competence in his major and minor fields.

201. INTERPRETING CURRENT EVENTS. S. 1 hr. A study of national and world news developments, their backgrounds, and their meanings. Staff
212. PUBLIC RELATIONS. I, II, S. 3 hr. Principles, problems, and practices concerned in the relationships of businesses, industries, and nonprofit organizations with their respective publics; practice in the evaluation of existing public relations programs; and their refinement for further effectiveness. Mr. Young
213. INDUSTRIAL JOURNALISM. II. 2 hr. PR: Journ. 212 or consent. A study of the relations between industry and its many publics, with emphasis on internal and external company publications as public relations media. Extensive practice in planning and writing material and in page makeup for industrial publications and trade journals. Mr. Young
215. HIGH SCHOOL JOURNALISM. II, S. 2 hr. A survey of scholastic publications problems and techniques; suggested methods of instruction. Staff
220. NEWSPAPER AND MAGAZINE ARTICLE WRITING. II. 2 hr. A seminar-type course devoted to the writing, editing, and marketing of features, including reviews and critical articles. Staff
227. HISTORY OF JOURNALISM. I, S. 3 hr. PR: Hist. 52, 53. A study of the impact of the American press on the nation; the development of today's communications media from their beginnings in 17th Century England and in the American colonies; and examination of the great names in journalism from the standpoint of their contributions to today's journalism; freedom of the press and its current implications. Mr. Stewart
230. EDITORIAL AND LAW OF THE PRESS. I. 2 hr. Writing and analyzing editorials and columns; a study of the editorial page and editorial ethics, problems, and policies; a study of the vital elements of libel, privacy, contempt, and other phases of law of the press. Mr. Wilson
235. EDITORIAL AND LAW OF THE PRESS. II. 2 hr. A continuation of Journ. 230. Mr. Wilson
239. SEMINAR IN ADVERTISING-MANAGEMENT PROBLEMS. II. 2 hr. PR: Major or minor in advertising. Current trends in advertising, merchandising, and distribution problems. Students develop individual projects in some phase of advertising or management. Mr. Summers
241. JOURNALISM PROBLEMS. I, II, S. 1-3 hr. For seniors and graduates. An intensive study, independently conducted, of a specialized area or problem in journalism, to be approved by the Dean. Staff
242. ADVANCED JOURNALISM PROBLEMS. I, II, S. 1-3 hr. A continuation of Journ. 241. Staff
243. INTERNATIONAL COMMUNICATIONS. I. 3 hr. International wire services. Coverage of world news in newspapers of the United States and foreign countries; and desirability of a free flow of information to and from the United States. United Nations efforts to lower news barriers will be examined. Mr. Wilson
301. RESEARCH METHODS AND LITERATURE. I, S. 3 hr. A study of methods common to communications research; critical examination of communications literature; independent research project by each student. Mr. Stewart
302. SEMINAR IN COMMUNICATIONS THEORY. II, S. 3 hr. Historical development of the mass media; problems of communicating with the various publics; general problems of contemporary mass media. Mr. Stewart
312. SEMINAR IN INSTITUTIONAL RELATIONS. II. 3 hr. A study of the problems of public relations and public information officers of educational institutions of higher learning and public service organizations; thorough study of the publics which these officers attempt to reach. Mr. Stewart
315. SEMINAR IN JOURNALISM EDUCATION. I, S. 1-3 hr. Discussion of journalism educational problems. Each student will do an individual research project

planned to provide for his professional development as a teacher of journalism. Emphasis on secondary school problems. Mr. Summers

322. SEMINAR IN RADIO-TELEVISION PROBLEMS. S. 3 hr. Investigation and discussion of current problems and practices in the field of broadcast journalism. The student and the instructor will choose a problem, or a phase of a problem, for analysis and research as the course progresses. Mr. Young
339. SEMINAR IN ADVANCED ADVERTISING MANAGEMENT PROBLEMS. II. 3 hr. Recently developed ideas and techniques in advertising, advertising research, and media management. Mr. Summers
343. SEMINAR IN THE FOREIGN PRESS. II. 3 hr. Studies in legal and communications problems of the international flow of news and opinion; international press codes; communications media of major countries. Mr. Wilson
380. THESIS. I, II, S. 2-6 hr. Staff

MEDICAL CENTER

The Departments of Biochemistry, Gross and Neurological Anatomy, Microbiology, Pharmacology, and Physiology each offer programs of study leading to the Master of Science and the Doctor of Philosophy Degrees. The Department of Microanatomy and Organology offers studies leading to the Master of Science Degree. Admission to these programs is permitted only with the approval of the department concerned. Students should contact the chairman of the major department and request permission to do graduate work well in advance of the time of registration.

REQUIREMENTS FOR ADMISSION TO GRADUATE STUDY IN THE MEDICAL CENTER

1. The student's undergraduate scholastic standing shall be a quality equivalent to that required for admission to the School of Medicine or School of Dentistry.
2. A transcript of the student's grades should be available to the major department at least six weeks before the beginning of the semester in which the student desires to start his graduate work. In addition, two letters of recommendation from professors in major and minor fields are desirable.
3. The student may be asked to appear in person.
4. The candidate must meet the admission requirements of the department in which he pursues his major study. Qualifying entrance examinations and/or the Graduate Record Examination may be required.
5. After acceptance and before registration, the student and his adviser shall formulate a schedule for the entire year.

STANDARDS FOR GRADUATE STUDY AND REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE

1. No credits are acceptable toward an advanced degree which are reported with a grade lower than "C." Certain departments require the student to maintain a "B" average or that two-thirds of the credits carry a grade of "B."
2. A minimum of 30 hours of related graduate courses shall be required. Twenty hours shall be in the major field which may include 6 hours credit for a thesis.
3. An examination in the major and related fields shall be given before the student can qualify for his final oral examination.
4. A thesis is required and shall represent original research by the candidate for the degree.

REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE FOR STUDENTS ENROLLED IN THE SCHOOLS OF MEDICINE OR DENTISTRY

1. Medical or Dental students shall fulfill the above requirements for admission and scholarship.
2. Students enrolled in the Schools of Medicine or Dentistry who hold a Bachelor's Degree from an approved institution and desire to do additional work for the Master's Degree must also register in the Graduate School.
3. Medical and Dental students may count preclinical courses in basic sciences toward the Master's Degree as long as they complete not fewer than 24 semester hours of graduate courses that are not required for the degrees of Doctor of Medicine or Doctor of Dental Surgery.
4. All courses offered to meet these requirements must be courses numbered between 200 and 399 that are approved by the Graduate School and listed in these *Announcements*.
5. A thesis is required.

REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE

1. The student must meet the standards of scholarship required for the Master's Degree and complete or offer previous graduate credit of no less than 60 semester hours of related course work, exclusive of research or thesis. However, these 60 semester hours may include 6 hours of research or thesis credit earned for the Master's Degree.
2. The residence requirements set by the Graduate School for the Degree of Doctor of Philosophy must be met.
3. Students will be required to take a comprehensive preliminary or qualifying examination, language examinations and a final examination as specified by the regulations of the Graduate School. Arrangements must be made with the major department which will determine the scope and nature (either oral or written or both) of these examinations. Also, the major department may request the Dean of the Graduate School to approve the substitution for French or German a more suitable foreign language.
4. Before admission to the final examination, the candidate must submit a thesis that presents the results of the candidate's individual investigation, demonstrates a mastery of research techniques, and represents a definite contribution to knowledge.

REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE FOR STUDENTS WHO ARE DOCTORS OF MEDICINE OR DENTAL SURGERY

1. Such students must meet the standards of scholarship required for the Master's Degree and complete not less than 30 semester hours of course work, exclusive of research or thesis, beyond that required for the professional degree.
2. The requirements, cited for the Doctor of Philosophy Degree, concerning examinations and thesis must be met.

MEDICAL CENTER COURSES OPEN TO GRADUATE STUDENTS

ANATOMY (Includes (1.) Gross and Neurological Anatomy and (2.) Microanatomy and Organology.)

Professors JOHNSON and WILLIAMS; Associate Professors HEWES, HIGGINBOTHAM, and REYER; Assistant Professor GOODGE; Clinical Associate Professors SHAFFER and SMITH.

201. GROSS ANATOMY. (With Medical Students). I and II. 12 hr. PR: General zoology and consent. A detailed study of the human body with a complete dissection.
203. NEUROANATOMY. (With Medical Students). II. 4 hr. PR: Consent. A gross and microscopic study of the central nervous system.

205. MICROANATOMY AND ORGANOLOGY. (With Medical Students). I. 6 hr. PR: General zoology or equiv. Structure, function and embryology of tissues and organs.
206. GROSS ANATOMY. (With Dental Students). I and II. 6 hr. PR: General zoology and consent. A study of the human body including dissection.
208. NEUROANATOMY. (With Dental Students). II. 2 hr. PR: Consent. A gross and microscopic study of the central nervous system.
209. MICROANATOMY AND ORGANOLOGY. (With Dental Students). I. 6 hr. PR: General zoology. Structure, function and embryology of tissues and organs with emphasis on teeth and supporting structures.
301. ADVANCED GROSS ANATOMY. I, II, S. 2-6 hr. per sem. Total of 36 hr. PR: Anat. 201 and consent. A morphological and functional analysis of a selected region. With dissection.
302. ADVANCED DEVELOPMENTAL ANATOMY. I, II, S. 2-6 hr. per sem. Total of 18 hr. PR: Anat. 201 and consent. Detailed developmental anatomy of the fetal period and of childhood. With dissections and analysis of variations and malformations.
303. SEMINAR. I, II, S. 1-6 hr. PR: Consent. Selected areas of study including historical aspects.
304. APPLIED ANATOMY. I, II. 2-6 hr. per sem. Total of 36 hr. PR: Anat. 201 and consent. A regional study primarily intended for physicians and surgeons.
305. EXPERIMENTAL EMBRYOLOGY. II. 3 hr. PR: Biochemistry, embryology, Microanat. 205, and consent. An analysis of development, differentiation and regeneration.
350. RESEARCH IN GROSS AND NEUROLOGICAL ANATOMY. I, II, S. 1-6 hr. PR: Anat. 201, 203.

BIOCHEMISTRY*

Professor KRAUSE; Associate Professors LOTSPEICH, SHELTON, BURKE, and CANADY; Assistant Professors GANGLOFF and CONNELLY; Instructor (part-time) GROSS.

223. BIOCHEMISTRY. (With Dental students). II. 7 hr. PR: Organic chemistry. A study of the chemical and physiochemical processes which take in the human body.
231. BIOCHEMISTRY. (With Medical students). I. 8 hr. PR: Organic chemistry, Content similar to Biochem. 223.
237. SEMINAR IN BIOCHEMISTRY. I, II. 1-6 hr. (1 hr. per sem.). PR or Conc: Biochem. 223 or 231. Presentation and discussion of special topics.
239. CLINICAL CHEMICAL TECHNIQUES. II. 4 hr. PR: Biochem. 139, 223, or 231. (Primarily for Medical Technology students). Open to other qualified students.
330. BIOCHEMICAL PREPARATIONS. I, II. 2-5 hr. PR: Biochem. 223 or 231 or equiv. Emphasis on biochemical methods.
331. RADIOBIOLOGY. II. 3 hr. PR: Biochem. 231 or 223 or equiv. Emphasis on nature and measurement of isotopes and their biological applications.
332. ENZYME KINETICS. II. 3 hr. PR: Biochem. 139, 223, or 231. For graduate students or other properly qualified students. An introduction to the physical mechanisms of enzyme action.
333. RESEARCH IN BIOCHEMISTRY. I, II, S. 1-6 hr. PR: Biochem. 231 or equiv.

*See Agricultural Biochemistry for other graduate courses in Biochemistry.

334. SPECIAL TOPICS. I, II, S. 1-6 hr. PR: Consent.
337. BIOCHEMISTRY OF THE AMINO ACIDS AND PROTEINS. I. 3 hr. PR: Agr. Biochem. 290 or Med. Biochem. 231. Offered in 1963-64 and every third year.
338. HORMONES, NATURE AND ACTION. I. 2 hr. PR: Rgr. Biochem. 290 or Med. Biochem. 231. Offered in 1963-64 and every third year.

MICROBIOLOGY

Professor SLACK; Assistant Professors BURRELL, DEAL, GERENCSE, HALL, and MASCOLI.

220. PATHOGENIC MICROBIOLOGY. (For Pharmacy students). II, S. 5 hr. PR or Conc: Chem. 238 (organic). A detailed study of pathogenic microorganisms.
221. MICROBIOLOGY. (For Medical students, second year). I. 7 hr. PR or Conc: Organic chemistry; biochemistry desirable. A detailed study of pathogenic microorganisms.
222. PARASITOLOGY. (For Medical students, second year). II. 2 hr. PR: Consent. Introduction to animal organisms as human pathogens and vectors of disease.
223. PATHOGENIC MICROBIOLOGY. (For Medical Technology students). II. 5 hr. PR or Conc: Organic chemistry. A detailed study of pathogenic microorganisms.
224. PARASITOLOGY. (For Medical Technology students). II. 4 hr. PR: Consent. Study of animal parasites and vectors of disease.
225. MICROBIOLOGY. (For Dental students). I. 5 hr. PR: Biochemistry. A detailed study of pathogenic microorganisms.
226. BASIC MICROBIOLOGY. I. 4 hr. PR: Consent. A detailed review of the major groups of microorganisms including morphology and physiology. Primarily for graduate students.
227. SPECIAL PROBLEMS IN MICROBIOLOGY. I, II, S. 1-6 hr. PR: Microbiol. 221 or equiv.
228. DIAGNOSTIC OF DETERMINATIVE MICROBIOLOGY. I, II, S. 1-6 hr. PR: Microbiol. 221 or equiv. Diagnostic procedures as aides to diagnosis of human diseases and methods for the identification of microorganisms.
321. BACTERIAL PHYSIOLOGY. I. 4 hr. PR or Conc: Microbiol. 221 or equiv. and biochemistry. Physiological studies on bacteria including nutrition, metabolic pathways, growth and death.
322. MICROBIAL GENETICS AND CYTOLOGY. II. 4 hr. PR: Microbiol. 221 or equiv. Principles of microbial genetics and advanced cytological techniques.
323. IMMUNOLOGY. II. 4 hr. PR: Microbiol. 221 or equiv. A thorough study of antigens, antibodies, and their reactions both *in vitro* and *in vivo* and including the hypersensitivity phenomenon.
324. VIROLOGY. II. 4 hr. PR: Microbiol. 221 or equiv. A study of human, animal and bacterial viruses.
325. MEDICAL MYCOLOGY. I. 3 hr. PR: Microbiol. 221 or equiv.; Mycol. 203 and 330 are recommended. A study of the fungi which infect humans with the emphasis on isolation and identification.
326. SEMINAR. I, II, S. 1-6 hr. PR: Microbiol. 221 or equiv. This will include the history of microbiology.
327. RESEARCH IN MICROBIOLOGY. I, II, S. 1-6 hr. PR: Microbiol. 221 or equiv.

PATHOLOGY

Professor ALBRINK; Associate Professors CONN, KELLN, and STUART; Assistant Professors FINK and NAPOLI; Instructors CHAMBERLAIN and JARVIS.

- 228. **PATHOLOGY.** (With Dental students). II. 4 hr. PR: Consent, Microscopic Anat. 209. A study of disease processes with emphasis upon fundamentals.
- 256. **ADVANCED PATHOLOGY.** I, II. 3 hr. PR: Consent, Path. 228. Microscopic and gross specimens from selected autopsies.
- 351. **RESEARCH.** I, II. 1-6 hr. PR: Consent.

PHARMACOLOGY

Professor WATTS; Associate Professors KENNY and SAXE; Assistant Professor FLEMING; Instructor ROBINSON.

- 260. **PHARMACOLOGY.** (With Dental students). I. 5 hr. PR: Physiology. Chemistry, pharmacodynamics, toxicology, and therapeutic use of drugs.
- 261. **FUNDAMENTALS OF PHARMACOLOGY.** (With Pharmacy students). I. 5 hr. PR: Physiology. Classification, pharmacodynamics, and toxicology of therapeutic agents.
- 262. **PHARMACOLOGY.** (With Medical students). II. 6 hr. PR: Physiology. Chemistry, pharmacodynamics, toxicology and therapeutic use of drugs.
- 265. **SEMINAR IN PHARMACOLOGY.** I, II. 1 hr. per semester. PR or Conc: Pharmacol. 262 or graduate status in basic medical sciences.
- 360. **SPECIAL TOPICS IN PHARMACOLOGY.** I, II, S. 1-6 hr. per sem. Assigned study in pharmacodynamics, autonomic and cardiovascular pharmacology, chemotherapy, bioassay, and the biochemistry of drug action.
- 362. **ADVANCED PHARMACOLOGY.** I, II, S. 1-6 hr. per sem. PR: Pharmacol. 262 or equiv. Lectures and laboratory study in advanced phases of pharmacology; development of research techniques.
- 367. **RESEARCH IN PHARMACOLOGY.** I, II, S. 1-6 hr. per sem. PR: Pharmacol. 262 or equiv.

PHYSIOLOGY

Professors NORTHUP, PENROD, STICKNEY, and VAN LIERE; Associate Professor LINDSAY; Assistant Professor GLADFELTER.

- 241. **HUMAN PHYSIOLOGY.** (With Medical students). II. 9 hr. PR: Comparative anatomy, Biochem. 231. A study of the functions of organs.
- 243. **HUMAN PHYSIOLOGY.** (With Dental students). I. 6 hr. PR: General zoology, organic chemistry. Normal functions of the body with emphasis on aspects pertaining to dentistry.
- 244. **SEMINAR IN PHYSIOLOGY.** I, II. 1-6 hr. (1 hr. per sem.). PR: Graduate status.
- 340. **SPECIAL TOPICS.** I, II, S. 1-12 hr.
- 342. **ADVANCED PHYSIOLOGY.** I, II, S. 1-6 hr. per sem. PR: Physiol. 241 or 243 or equiv. Historical review, discussion of latest developments.
- 346. **RESEARCH IN PHYSIOLOGY.** I, II, S. 1-12 hr.

MEDICINE

Professors FLINK and SLEETH; Clinical Professor WHITTLESEY; Associate Professors ANDREWS and LAWLESS; Clinical Associate Professor MAXWELL; Assistant Professors CONN and HARLEY; Clinical Assistant Professor JOHNSON; Instructor ANDERSON; Clinical Instructors GLICK, PIATT and STOUT.

- 223. **HISTORY OF MEDICINE.** (With Medical students). I. 1 hr. A brief history of the development of the art and science of medicine.

PHARMACY

Professors BACHMANN, GEILER and HAYMAN; Assistant Professors BLISSITT, CORE, O'CONNELL, and WOJCIK; Instructors GEORGE and THACKER.

272. ORGANIC PHARMACEUTICAL CHEMISTRY. I. 3 hr. PR: Biochem. 139 and Pharm. 142. A study of the modern synthetic drugs and natural products, with regard to nomenclature, methods of synthesis and relation to other drugs having similar therapeutic, physical and chemical properties. (45 hr.)
273. ORGANIC PHARMACEUTICAL CHEMISTRY. II. 3 hr. PR: Pharm. 272. A continuation of Pharm. 272. (45 hr.)
274. ASSAY AND PHARMACEUTICAL TESTING. II. 3 hr. PR: Pharm. 201 and 272. Application of basic scientific principles to the standardization and analysis of drugs and pharmaceutical products, with particular attention to newer analytical techniques. Lectures and laboratory. (105 hr.)

MUSIC

Prospective students in Music are required to have completed the prescribed four-year curriculum of undergraduate study in Music at West Virginia University or its equivalent at another institution of recognized standing, pass qualifying examinations in Theory, Music History and auditions in Applied Music.¹ These examinations are given beginning three days prior to the dates of general University registration as listed in the University Calendar. All prospective graduate students must have taken these examinations before being allowed to register. Students will be required to make up any undergraduate deficiencies indicated by the results of these examinations. For Grade Level requirements in Applied Music for entering graduate candidates see the *Announcements* of the School of Music.

THE DEGREE OF MASTER OF MUSIC

Candidates must establish an over-all grade-point average of 3.0 (B) within a maximum of 36 hours. Applicants will be admitted to candidacy upon the completion of 12 semester hours of graduate study. No student will be admitted to candidacy who has not removed all undergraduate deficiencies and maintained a 3.0 (B) average in all graduate work completed by that time.

Candidates for the Master of Music degree may major in one of six fields; Music Education, Applied Music, Theory, Composition, Church Music, and History of Music.

Graduate students majoring in Music Education will be allowed one of the following options, to be determined in consultation with their adviser:

1. Take 30 hours in approved courses, including 4 hours for thesis.
2. Take 30 hours in approved courses, and give a representative public recital in lieu of writing a thesis. Candidates selecting this option must be recommended by the proper music instructor and approved by the faculty. The recital carries 2 hours credit.
3. Take 36 hours in approved courses without thesis or recital. Six of the 36 hours may be in approved fields other than music.

A representative public recital is required of candidates majoring in Applied Music. Composition majors must submit as a thesis a composition in a large form.

All graduate students are required to participate at least two clock hours per week in a major performing group.

A general comprehensive oral examination must be passed by all candidates for the Master of Music degree. Candidates may repeat this examination after a three-month period. The results of the second oral examination will normally be considered final. The examining committee will decide immediately after an unsuccessful second attempt whether a petition for a third attempt will be permitted.

¹Graduates of the School of Music will be admitted on their past record without these qualifying examinations, unless it is deemed necessary by the Dean of the School of Music. See Graduate Applied Music Requirements.

The following are the six curricula:

<i>Music Education</i> (with thesis)	<i>Hr.</i>	<i>Applied Music</i>	<i>Hr.</i>
M. 300—Applied Music	8	M. 300—Applied Music (Major instrument)	8
M. 310—Conducting	3	M. 326—Music Literature Survey	4
M. 340—Choral Techniques, or		M. 327—Music Literature Survey	4
M. 342—Instrumental Techniques	3	M. 398—Recital	4
M. 344—Music Education	3	Music Electives	10
M. 346—Introduction to Research in Music Education	3		30
M. 399—Thesis	4		
Electives, Music	6		
	30	<i>History of Music*</i>	<i>Hr.</i>
<i>Composition</i>	<i>Hr.</i>	M. 300—Applied Music	4
M. 300—Applied Music	4	M. 399—Thesis, or M. 396—2 lecture recitals	4
M. 360—Composition	3	M. 330—Introduction to Research in Musicology	3
M. 361—Composition	3	M. 331—Seminar in Musicology	3
M. 365—Counterpoint	2	M. 367—Style Survey	3
M. 366—Counterpoint	2	M. 368—Style Survey	3
M. 370—Orchestration	3	M. 332—Music in the Middle Ages	
M. 371—Orchestration or M. 372, Band Arranging	3	Or	
M. 375—Pedagogy of Theory	2	M. 336—Music in the Baroque Period	3
M. 376—Pedagogy of Theory	2	M. 333—Music in the Renaissance	
M. 399—Thesis	4	Or	
	30	M. 337—Music in the Classic and Romantic Periods	3
		Electives	4
			30

*Candidates majoring in Music History must complete a minor field of 8 semester hours in some area of music or a cognate area. Prerequisite: 12 undergraduate hours in Music History and Literature (Music 140, 141, 280, 281, 282, 283, or equivalents.)

<i>Church Music</i> (Voice Emphasis)	<i>Hr.</i>	<i>Church Music</i> (Organ Emphasis)	<i>Hr.</i>
M. 300—Voice	8	M. 300—Organ	8
M. 300—Piano or Organ	2	M. 231—Principles of Vocal Production	2
M. 232—Church Music	3	M. 232—Church Music	3
M. 233—Liturgies	3	M. 233—Liturgies	3
M. 310—Conducting	3	M. 310—Conducting	3
M. 340—Choral Techniques	3	M. 340—Choral Techniques	3
M. 334—Choir Seminar	2	M. 334—Choir Seminar	2
M. 335—Choir Seminar	2	M. 335—Choir Seminar	2
M. 398—Recital or M. 399, Thesis	4	M. 398—Recital or M. 399, Thesis	4
	30		30

<i>Theory</i>	<i>Hr.</i>
M. 300—Applied Music	4
M. 365—Counterpoint	2
M. 379—Counterpoint	2
M. 370—Orchestration	3
M. 371—Orchestration or M. 372, Band Arranging	3
M. 375—Pedagogy of Theory	2
M. 376—Pedagogy of Theory	2
M. 367—Style Survey	3
M. 368—Style Survey	3
M. 369—Theory Research	2
M. 399—Thesis	3

THE DEGREE OF DOCTOR OF PHILOSOPHY

Admission. Applicants to the program leading to the degree of Doctor of Philosophy must present necessary credentials for evaluation of previous training and experience to the Admissions Committee of the School of Music. This includes a transcript of all grades and must show proof that the applicant has had a minimum of 28 semester-hours in liberal arts studies. Prior to admission to the program the Committee may, at its discretion, require the applicant to take entrance tests in various fields of music, or the I.E.R. Intelligence Scale "C.A.V.D." test (or some similar test of mental ability), or it may require the applicant to present himself for a personal interview, or any of the three. Under normal circumstances the applicant must have attained an average grade of B in courses taken for his Master's degree. However, if sufficient professional experience should warrant, the Committee may waive the requirement of a B average or may grant an applicant conditional admittance subject to the satisfactory completion of certain specified courses or the attainment of a specified grade-point average within a semester's work.

Candidacy. Graduate students meeting the requirements of the School of Music and the general requirements of the Graduate School will be recommended to the Dean of the Graduate School for admission to candidacy for the degree. These requirements are:

1. Demonstrate the ability to read German and French. (Upon the recommendation of the adviser and with the approval of the Dean of the Graduate School, one other language may be substituted for French or German).
2. Pass written examinations satisfactorily to show:
 - a. Broad knowledge in "Theory" and "Music History and Literature."
 - b. Knowledge in depth in the field of specialization.
3. Pass satisfactorily a comprehensive oral examination covering the entire field of music.
4. Present and have accepted an outline and prospectus of the dissertation.

Graduate students who have met these requirements and who have maintained an average of B in courses completed shall be admitted to candidacy. Should the applicant fail the written examinations he may apply to take them again after a minimum period of three months. Should the applicant fail the comprehensive oral examination he may be examined again after a minimum period of six months. The results of the second oral examination will be considered final. Admission to candidacy must precede the conferring of the degree by at least one year.

REQUIREMENTS FOR COMPLETION

Fields of Specialization. Candidates shall select a program within one of the following fields of specialization: (1) Theory; (2) Composition; (3) Music Education; (4) Musicology. In addition, a minor field consisting of a minimum of 12 credit hours in another field of music or a cognate field will be required of all candidates, and will be chosen with the approval of the doctoral committee.

Curriculum. The exact amount and nature of course work to be undertaken by a candidate will be determined by the adviser with the approval of the doctoral committee in the light of the candidate's previous preparation and his field of specialization. The total of graduate courses shall be not less than 70 credit hours, exclusive of the doctoral dissertation. Of these 70 hours, a maximum of 24 credit hours will be applied from a master's degree or equivalent if of suitable character and quality.

Residence. In general, the requirements for the degree of Doctor of Philosophy contemplate at least three years of full-time graduate work. A minimum of 36 weeks is required in residence in full-time graduate study at West Virginia University beyond the master's degree or its equivalent.

Dissertation. The candidate must submit a dissertation pursued at West Virginia University under the direction of a major professor which demonstrates a high order of independent scholarship, originality, competence in research, and an original contribution to the field of specialization. If the candidate's field of specialization is Composition the dissertation will be an original, major (*i.e.*, full-length) composition such as a symphony, concerto, chamber opera, oratorio, symphonic poem, etc.

Final Examination. If the candidate's dissertation is approved and he has fulfilled all other requirements, he will be admitted to the final oral examination before his doctoral committee. At the option of his committee, a written examination may also be required. The final examination(s) shall be concerned with the dissertation, its contribution to knowledge, and the candidate's grasp of his field of specialization and its relation to other fields.

Time Limitation. Requirements for the degree of Doctor of Philosophy must be completed within seven years of admission to candidacy.

THE DEGREE OF DOCTOR OF EDUCATION

The degree of Doctor of Education is offered in cooperation with the College of Education. The sequence of prerequisites to admission, prerequisites to candidacy, and requirements for the degree are set out in the "Education" section, page 127. The requirements for the degree of doctor of education for students in music are identical with those for students in education, except that, for students in music, a maximum of 24 semester hours of graduate work pursued in fulfillment of the requirements, for the master's degree or its equivalent, if of suitable character and quality, may be credited toward the doctorate.

Applied Music

300. APPLIED MUSIC. I, II. 1-4 hr. Open to qualified students in any field in Applied Music. Course number may be repeated as many times as necessary or desirable. A student must demonstrate ability of grade-level 4 on an instrument to receive credit in Music 300 on that instrument. Students other than music majors may take a maximum of one 30-minute lesson per week at one hour credit. Staff

Conducting

310. CONDUCTING. I. 3 hr. PR: Music 184 or equiv. A graduate course in instrument and choral conducting. Major works are prepared and conducted through the use of recordings and the large University music organizations. Staff
311. CONDUCTING. II. 3 hr. PR: Music 310. Continuation of Music 310. Staff

Literature

218. METHODS AND PEDAGOGY IN MAJOR APPLIED FIELDS. I. 1 hr. PR: Music 150. Staff
219. METHODS AND PEDAGOGY IN MAJOR APPLIED FIELDS. II. 1 hr. PR: Music 218. Staff
220. REPERTOIRE. I. 1 hr. Staff
221. REPERTOIRE. II. 1 hr. Staff
280. SURVEY OF OPERATIC MUSIC. II. 2 hr. PR: Music 141. Offered in 1964-65. Mr. Schafer
281. SURVEY OF SYMPHONY MUSIC. I. 2 hr. PR: Music 141. Offered in 1964-65. Mr. Schafer
282. STUDIES IN CONTEMPORARY MUSIC. I. 2 hr. PR: Music 141. Offered in 1963-64 and 1965-66. Mr. Schafer
283. SURVEY OF CHAMBER MUSIC. II. 2 hr. PR: Music 141. Offered in 1963-64 and 1965-66. Mr. Schafer
284. COLLEGIUM MUSICUM. I, II. 0-2 hr. PR: Music 140 and consent. Preparation and performance of musical works of earlier periods. Mr. Kirby
326. MUSIC LITERATURE SURVEY. I. 4 hr. PR: Music 140, 141. Intensive study of the history of music, music literature, musical documents, and the philosophies of music theory and aesthetics from Greek Antiquity up to 1750. Mr. Schafer
327. MUSIC LITERATURE SURVEY. II. 4 hr. PR: Music 140, 141. Continuation of Music 326, covering European music from 1750 to the present and music in America from Colonial times to the present. Mr. Schafer

328. ADVANCED SEMINAR IN MUSICOLOGY. I, II. 4 hr. PR: Music 331 and completion of doctoral qualifying examinations in French and German. Intensive individual investigation and preparation of research papers. Primarily intended for doctoral students in Musicology. Offered in 1963-64 and 1965-66. Mr. Kirby
329. ADVANCED SEMINAR IN MUSICOLOGY. I, II. 4 hr. PR: Music 328. Continuation of Music 328. Offered in 1963-64 and 1965-66. Mr. Kirby
330. INTRODUCTION TO RESEARCH. I. 3 hr. PR: Music 140-141, or equiv. A study of the field of musical research, with emphasis placed on the technic of research in music history. Mr. Kirby
331. SEMINAR IN MUSICOLOGY. II. 3 hr. PR: Music 330. Musical research and investigation. Special fields of study will be selected for each term and individual projects undertaken. Course may be repeated for credit. Mr. Kirby
332. MUSIC IN THE MIDDLE AGES. 3 hr. PR: Music 140-141 or equiv. and consent. A detailed study of the music and musical practice from the beginning of the Christian era to 1400. Offered II. 1962-63, S. 1964, I. 1965-66. Mr. Schafer
333. MUSIC IN THE RENAISSANCE. 3 hr. PR: Music 140-141 or equiv. and consent. Continuation of Music 332 through the 16th century. Offered S. 1963, I. 1964-65, II. 1965-66. Mr. Schafer
336. MUSIC IN THE BAROQUE PERIOD. 3 hr. PR: Music 140-141 or equiv. and consent. A detailed study of the music and musical practice of the period from 1600 to 1750. Offered I. 1963-64, II. 1964-65, S. 1966. Mr. Schafer
337. MUSIC IN THE CLASSIC AND ROMANTIC PERIODS. 3 hr. PR: Music 140-141 or equiv. and consent. Continuation of Music 336 covering the period from 1750 to 1900. Offered II. 1963-1964, S. 1965, I. 1966-67. Mr. Schafer
338. HISTORY OF NOTATION. I. 2 hr. PR: Music 140-141 or equiv. A detailed study in transcribing the musical manuscripts of the Middle Ages. Offered 1964-65. Mr. Kirby
339. HISTORY OF NOTATION. II. 2 hr. PR: Music 140-141 or equiv. Continuation of Music 338, covering the Renaissance Period. Offered 1964-65. Mr. Kirby

Church Music

231. PRINCIPLES OF VOCAL PRODUCTION. II. 2 hr. Class lessons in voice stressing the fundamentals of voice production and pedagogy. Staff
232. CHURCH MUSIC. I. 3 hr. PR: Music 140-141 or equiv. A study of hymnology, anthems, cantatas, and oratorios appropriate to the liturgical year. Mr. English
233. LITURGIES. II. 3 hr. PR: Music 232. A historical study of Jewish, Catholic, and Protestant liturgies. Mr. English
334. CHOIR SEMINAR. I, II. 2 hr. PR: Music 184 or equiv. Development of a choir for a period of two semesters, culminating in a performance of a program of sacred music. Mr. English
335. CHOIR SEMINAR. I, II. 2 hr. PR: Music 334. Continuation of Music 334. Mr. English

Music Education

200. BAND, ORCHESTRA, CHORAL, OPERA THEATRE, AND MUSIC EDUCATION CLINICS. 2 hr. Special problems of organization and development of the various performing organizations. Lecture, laboratory and discussion groups. Staff
201. MUSIC IN THE ELEMENTARY SCHOOL. I, II. 2 hr. PR: Music 10, 11, 12, or consent. Development of skills, procedures, techniques and materials used by the general classroom teacher of music in grades 1-8. Not open to music majors. Miss Scott

246. MUSIC IN THE JUNIOR HIGH SCHOOL. I. 2 hr. PR: Music 181-182 or equiv. A consideration of the potentialities and special needs of the junior high school in music education; programs, procedures and materials. Offered 1964-65. Mr. Brown
340. CHORAL TECHNIQUES. I. 3 hr. PR: Music 181-182 or equiv. Study and practice in the development of choral groups. Mr. Brown
342. INSTRUMENTAL TECHNIQUES. II. 3 hr. PR: Music 181-182 or equiv. Study and practice in the development of instrumental groups. Staff
344. MUSIC EDUCATION. II. 3 hr. PR: Music 181-182 or equiv. Survey and critical study of the total music education curriculum. Mr. Brown
345. THE SUPERVISION OF MUSIC. II. 2 hr. PR: Music 181-182 or equiv. Problems in the supervision of music in the elementary grades and in junior high school. Offered 1964-65. Mr. Brown
346. INTRODUCTION TO RESEARCH IN MUSIC EDUCATION. I. 3 hr. PR: Music 181-182 or equiv. Discussion and independent research problems in the general field of Music Education. Research report required. Mr. Horacek
347. SEMINAR IN MUSIC EDUCATION. I. 4 hr. PR: Music 344 and consent. Extensive individual reading and reports on the history, philosophy, and aims of music education in the university, college, conservatory, and public schools. Offered 1963-64 and 1965-66. Mr. Horacek
348. SEMINAR IN MUSIC EDUCATION. II. 4 hr. PR: Music 347. Continuation of Music 347. Emphasis on the curriculum, organization, and administration of the total music education program. Offered 1963-64 and 1965-66. Mr. Horacek
349. PSYCHOLOGY OF MUSIC. I. 3 hr. The science and physics of sound as applied to music and a study of the psychological difference in music and hearing. Mr. Horacek
350. PSYCHOLOGY OF MUSIC. II. 3 hr. PR: Music 349. A continuation of Music 349 with special attention to criticism and evaluation of existing sensory, motor, feeling, and achievement tests in music, as well as developing new tests on elements which make up the musical mind. Offered 1964-65. Mr. Horacek
351. MUSIC IN SOCIETY. I. 2 hr. PR: Music 141 or consent. The function throughout history of music in society; the relation between social factors and musical practice. Offered 1964-65. Mr. Horacek
352. AESTHETICS OF MUSIC. II. 2 hr. PR: Music 141 or consent. An examination of the main classical and contemporary aesthetic theories and their applications to music. Mr. Horacek

Opera

210. OPERA THEATRE. I, II. 2 hr. Maximum credit 8 hr. PR: Music 20 or consent. Continuation of Music 20. Performance of major roles and advanced production techniques. Qualified students will undertake production-direction projects under supervision. Mr. Golz

Theory and Composition

250. ADVANCED HARMONY. II. 3 hr. PR: Music 4 or consent. A course in the harmonic practice of Romantic and twentieth century composers. Offered 1963-64 and 1965-66. Mr. Graves
360. COMPOSITION. I, II. 3 hr. PR: Consent. A course primarily for candidates for the graduate degrees in Theory or Composition. Mr. Graves
361. COMPOSITION. I, II. 3 hr. PR: Music 360. Continuation of Music 360. Mr. Graves
362. COMPOSITION. I, II. 3 hr. PR: Music 361. Continuation of Music 361. Mr. Graves
363. COMPOSITION. I, II. 3 hr. PR: Music 362. Continuation of Music 362. Mr. Graves

365. COUNTERPOINT. I. 2 hr. PR: Music 4 and consent. A graduate course in 16th century counterpoint. Mr. Lefkoff
366. COUNTERPOINT. II. 2 hr. PR: Music 365. Continuation of Music 365. Offered 1964-65. Mr. Lefkoff
367. STYLE SURVEY. I. 3 hr. PR: Music 140, 141 or equiv. An analytical study of musical styles from early Gregorian chant through the 16th century. Mr. Lefkoff
368. STYLE SURVEY. II. 3 hr. PR: Music 367. An analytical study of musical styles from the 17th century to the mid-19th century. Mr. Lefkoff
369. RESEARCH. I, II. 2 hr. Music 232, 330, 346, or 365, and consent. Independent research projects in Theory, Music History, Music Education, or Church Music. Staff
370. ORCHESTRATION. I, II. 3 hr. PR: Music 118 or equiv. Major projects in orchestration. Mr. Graves
371. ORCHESTRATION. I, II. 3 hr. PR: Music 370. Continuation of Music 370. Mr. Graves
372. BAND ARRANGING. II. 3 hr. PR: Music 119 or equiv. Major projects in arranging for the concert band. Staff
375. PEDAGOGY OF THEORY. I. 2 hr. PR: Music 4 and consent. Consideration of the various approaches to the teaching of theory. Mr. Lefkoff
376. PEDAGOGY OF THEORY. II. 2 hr. PR: Music 375. Continuation of Music 375. Mr. Lefkoff
377. COMPOSITION SEMINAR. I, II. 4 hr. PR: Music 361 and consent. Work in larger compositional problems and examination of technical features in works of recognized composers. Primarily intended for doctoral candidates in composition. Offered 1964-65. Mr. Graves
378. COMPOSITION SEMINAR. I, II. 4 hr. PR: Music 377. Continuation of Music 377. Offered 1964-65. Mr. Graves
379. 18TH CENTURY COUNTERPOINT. II. 2 hr. PR: Music 4 and consent. A graduate course in 18th century Counterpoint. Mr. Lefkoff
380. 16TH CENTURY COUNTERPOINT. I. 2 hr. PR: Music 366. Study of secular style of 16th century madrigal and chanson. Offered 1964-65. Mr. Lefkoff
381. STYLE SURVEY. I. 3 hr. PR: Music 368. An analytical study of musical styles of the late 19th century and early 20th century. Offered 1963-64 and 1965-66. Mr. Lefkoff
382. STYLE SURVEY. II. 3 hr. PR: Music 381. An analytical study of 20th century music with emphasis on serial techniques and contemporary trends. Offered 1963-64 and 1965-66. Mr. Lefkoff
383. THEORY SEMINAR. I, II. 4 hr. PR: Music 382 or consent. Intensive individual investigation and preparation of research papers. Primarily intended for doctoral candidates in Theory. Offered 1964-65. Mr. Lefkoff
384. THEORY SEMINAR. I, II. 4 hr. PR: Music 383. Continuation of Music 383. Offered 1964-65. Mr. Lefkoff

Thesis or Recital

395. DISSERTATIONAL GUIDANCE. I, II. 1-8 hr. Credit not to be applied toward the 70-hour minimum for the Ph.D. or Ed.D. Staff
396. TWO LECTURE RECITALS. 1-4 hr. For History of Music Majors only. Staff
397. RECITAL. 2 hr. For Music Education Majors only. Staff
398. RECITAL. 1-4 hr. PR: Music 199 or equiv. Staff
399. THESIS. 1-4 hr. Staff

PHYSICAL AND HEALTH EDUCATION, RECREATION, AND SAFETY

The School of Physical and Health Education, Recreation, and Safety offers courses leading to the Master of Science Degree, with an emphasis in Health and Safety Education, Physical Education, or Recreation; or combinations of all three areas.

Students are admitted for graduate work in the School of Physical and Health Education, Recreation, and Safety provided they hold a baccalaureate degree from an approved college; have a 2.5 (C+) grade-point average for the work completed in their junior and senior undergraduate years; and satisfy prerequisites in the courses for which they register.

Students who do not meet the 2.5 grade-point average requirement may be admitted on probation and will be required to make a 3.0 (B) average in the first 12 semester hours of residence work in order to continue.

Students are accepted as advanced degree candidates upon written application to the Committee on Graduate Courses of the School of Physical and Health Education, Recreation, and Safety and a preliminary qualifying examination following one semester, or two summer terms, (12 semester hours) of graduate residence work* provided they:

A. Are certified to teach physical education; or have at least 24 semester hours, or its equivalent** which is an undergraduate minor in either physical education, health and safety education, recreation, or a combination in these areas. The equivalent is determined by the Committee on Graduate Courses.

B. Demonstrate to the satisfaction of the Committee on Graduate Study a grasp of the important phases and problems of the field, the ability to successfully complete the program of study, and give promise for professional leadership.

ADMISSION TO THE GRADUATE SCHOOL

Admission to Graduate School (see page 28) does not constitute admission to candidacy for the Master of Science Degree. The Dean of the Graduate School and the Graduate adviser in the School of Physical and Health Education, Recreation, and Safety will advise the student concerning departmental prerequisites and advanced degree requirements.

THE DEGREE OF MASTER OF SCIENCE

Thirty-six semester hours are required for the Master of Science Degree, distributed as follows:

- I. A *minimum* of 24 semester hours in the areas of Health Education, Physical Education, Recreation, and/or Safety Education, of which:
 - A. 15 semester hours must be in a single interest area,† including the basic course, (Health Educ. 205 or Phys. Educ. 294, or Rec. 202, or Safety Educ. 283 and "Introduction to Research," HPERS 375).
 - B. 3 semester hours in each of two allied areas: Health Education, Physical Education, Recreation *OR* Safety Education.
- II. A minimum of 6 semester hours of approved course work in related areas other than Health Education, Physical Education, Recreation, and Safety Education.
- III. Nine semester hours of electives in the specialized or related areas.
- IV. Six semester hours may be earned for the writing of a thesis; or 3 semester hours may be earned for the writing of a problem.
- V. A minimum of 12 semester hours must be in courses numbered 300 and above.
- VI. Degree candidates must have a 3.0 grade-point average for graduation.

*Courses taken in University Extension are accepted for degree purposes, provided the student has had prior approval from his adviser.

**Experience in teaching Health, Physical Education and Recreation Leadership, and coaching experience may be evaluated by special examination to adjust some of the undergraduate requirements.

†Health Education and Safety Education are considered a single area.

THE DEGREE OF DOCTOR OF EDUCATION

The Degree of Doctor of Education is offered in cooperation with the College of Education. Admission to the Graduate School and enrollment in graduate courses do not themselves imply acceptance of the applicant for a Doctor of Education Degree. The sequence of prerequisites to admission, prerequisites to candidacy, and requirements for the degree are as follows:

Admission Into the Doctoral Program. Applicants expressing a desire to pursue a program leading to the Doctor of Education Degree are required to satisfy a College of Education faculty Committee on Prerequisites in the following ways:

A. Furnish evidence of three or more years of successful teaching and/or closely related experience.

B. Hold a Master's Degree or its equivalent with a grade-point average of 3.0 (B) or higher.

C. Submit evidence of satisfactory performance on Graduate Record Examination.

D. Demonstrate by means of selected oral and written tests, ability to undertake a doctoral program of study and research.

E. Complete, in a satisfactory manner, if required, a trial period of resident study.

Doctoral Committee. When an applicant has received the permission of the Graduate School to enter upon an organized program of advanced graduate study and research, he will be assigned an adviser by the Dean of the College of Education. The Dean of the Graduate School and the adviser will jointly select a doctoral committee consisting of five or more members, of whom at least one shall be from a field other than Education. For applicants of the cooperating schools, colleges, and departments, two of the five members shall be selected from the student's major discipline, one of whom shall serve as co-chairman. This committee will be appointed immediately following the successful completion of the screening examination.

The adviser shall serve as chairman of the doctoral committee, and this committee shall have charge and direction of the applicant's program. This program, prepared by the adviser and the applicant prior to the completion of twelve hours of resident course work beyond the Master's Degree, must be approved by the doctoral committee and by the Dean of the Graduate School.

REQUIREMENTS FOR COMPLETION

Curriculum. The exact amount and nature of course work to be undertaken by a candidate will be determined in the light of his previous preparation and the demands of his chosen field of application. The aggregate of courses of graduate study shall be 70 or more semester hours, exclusive of the dissertation, of which a minimum of one-half of the semester hours in Education and one-third of the semester hours in cognate courses shall be on the 300 level. Not more than 12 of the 70 hours may be earned in extension and/or practicum or field work. The program of course work shall include a minimum of 24 semester hours in professional Education and a minimum of 24 semester hours in courses other than professional Education. These courses shall be so ordered and distributed as to promote broad and systematic knowledge and ability to conduct independent research. Course work taken at another institution, if of suitable character and quality, may be accepted at the discretion of the Doctoral Committee.

Candidates having an earlier graduate degree or its equivalent from West Virginia University will be required to complete a prescribed number of resident graduate hours in one or more other institutions.

Qualifying Examination. After the applicant has spent at least one semester, or its equivalent, in full-time residence study beyond the successful completion of the screening examination, he will be eligible for the written and oral qualifying examinations, scheduled and conducted by the Chairman of the Graduate Committee, in the areas of general professional education, specialization, and cognates.

The applicant must: (a) show satisfactory knowledge of the important phases and problems of the field of major study and their application to other fields of human knowledge and accomplishment; (b) demonstrate the ability to employ rationally the appropriate instruments of research; and (c) present a written tentative outline of a proposed research project.

After successful completion of the written qualifying examination, the oral portion of the qualifying examination is scheduled within a reasonable time. If the committee is not satisfied with the applicant's performance, it will make specific recommendations for additional work in preparation for a second examination that may be undertaken not earlier than six months nor later than twelve months after the first trial. The outcome of the second attempt will be considered final.

When the applicant has passed the written and oral qualifying examination, he will be admitted to candidacy for the Doctor of Education Degree. Admission to candidacy must precede the final examination by at least one academic year in time and 12 semester hours in credit. A maximum of 24 semester hours of graduate work pursued in fulfillment of the requirements for the Master's Degree or its equivalent, if of suitable character and quality, may be credited toward the doctorate.

Residence. In general, requirements for the Doctor of Education Degree contemplate three years of full-time graduate work beyond the Bachelor's Degree, including a minimum of two semesters in residence in full-time graduate study in West Virginia University beyond the Master's Degree or its equivalent.

Special Requirements. In addition to general curriculum requirements, candidates must demonstrate competence in the techniques of statistical research, evidence of a functioning command of appropriate methods of educational investigations, and mastery of the rules of manuscript preparation.

Dissertation. The candidate must submit a dissertation, pursued under direction of his doctoral committee, on a problem in the field of his major interest. The dissertation must show familiarity with previous research in the general area of the problem; embody a clear definition of the particular problem pursued; employ valid methods of research; demonstrate the ability to create and evaluate new knowledge; present and interpret unequivocally the results of the candidate's individual investigation; and disclose his ability to apply his contribution to the solution of educational problems. The final copy of the dissertation must be approved by a designated member of the University's Department of English.

Final Examination. If the candidate's dissertation is approved and he has fulfilled all other requirements, he will be admitted to the final oral examination before his committee. At the option of his committee a written examination also may be required. The final examination or examinations shall be concerned with the dissertation, its contribution to knowledge, and the candidate's grasp of his field of specialization, and its relation to other fields. No candidate may proceed to his final examination until he has fulfilled residence requirements for the degree and until he has completed at least 12 semester hours of graduate study after admission to candidacy.

Time Limitation. Requirements for the Doctor of Education Degree must be completed within seven years after successful completion of the preliminary examination of the College of Education.*

HEALTH EDUCATION

201. **ADVANCED SCHOOL HEALTH. I, S. 3 hr. PR:** Health Educ. 101, 20 hr. of Education, or consent. An analysis of problems in school health services, healthful school living, the nature of health education and the scope of health instruction which confronts teachers and administrators. Mr. Holter
205. **PHILOSOPHY OF HEALTH EDUCATION. I, S. 3 hr. PR:** Health Educ. 2, and 101, or equiv. Analysis of the scientific bases, purposes, procedures, and content, with implications for school and public health education programs. Mr. Holter
301. **COMMUNITY HEALTH. II, S. 3 hr. PR:** Health Educ. 2, and 205, or equiv. Health problems requiring community action, basic public health activities, community organization for health protection, voluntary health agencies, school health programs and the role of state and federal agencies in the community health program. Mr. Holter and Visiting Lecturers
376. **EVALUATION OF HEALTH INFORMATION. I, S. 3 hr. PR:** Health Educ. 2, and 201, or 20 hr. of Education and consent. Study of published material to determine basic scientific accuracy and value. Mr. Holter

*Effective September, 1963.

394. SEMINAR IN HEALTH EDUCATION. I, II, S. 4 hr. PR: Health Educ. 205. An overview and critical analysis of the literature and research in health education. Mr. Holter
397. INDIVIDUAL RESEARCH PROBLEMS IN HEALTH EDUCATION. I, II, S. 1-4 hr. PR: Health Educ. 205, and HPERS 375 or 395, or Educ. 301. Opportunity for independent study and investigation of pertinent problems. For advanced students with practical experience. Mr. Holter
398. PRACTICUM IN HEALTH EDUCATION. I, II, S. 4 hr. PR: Health Educ. 394, and HPERS 396 and 397. Program planning curriculum development and job functions in health education. Mr. Holter

PHYSICAL EDUCATION

206. PROGRAM IN INDIVIDUAL SPORTS. S. 3 hr. PR: Phys. Educ. 51, 55, 56, 155 or equiv. Designed for coaches of interscholastic athletics. A study of advanced coaching techniques and methods in track and field activities, wrestling, and gymnastics. Messrs. Bonsall, Harrick, and Romanoski
207. PROGRAM IN TEAM SPORTS. S. 3 hr. PR: Phys Educ. 51, 55, 56, 155, or equiv. Designed for coaches of interscholastic and intercollegiate athletics. A study of advanced techniques, systems of play, offense, defense, methodology, staff organization, and related problems in the coaching of football, basketball, and baseball. Messrs. Barnette, Harrick, and King
208. ADVANCED ATHLETIC TRAINING AND CONDITIONING. I, S. 3 hr. PR: Phys. Educ. 121, 175; Zool. 171, or equiv. To acquaint graduate students with recent theories, practices and techniques in the prevention, care and treatment of athletic injuries. Mr. Donley
209. OFFICIATING FOOTBALL AND BASKETBALL. I, S. 2 hr. Rules and techniques of officiating, officials' organizations, and laboratory work. Mr. Tork
210. PROGRAM IN SPORTS. S. 3 hr. (W). PR: Phys. Educ. 31, 32, or equiv. Designed especially for women engaged in teaching and coaching. Organization and administration of individual, dual, and team sports. Practicum in girls' and women's sports. Mrs. Beto
211. ORGANIZATION AND ADMINISTRATION OF INTRAMURAL SPORTS. I, S. 3 hr. PR: 4 hr. of physical education activity courses. Critical analysis with view to justification from standpoint of objectives and of contribution to general welfare of students participating. Organization and administration of programs on secondary and college levels. Mr. Semon
212. EXTRACURRICULAR PHYSICAL EDUCATION ACTIVITIES FOR SECONDARY SCHOOL GIRLS. I, S. 3 hr. PR: Consent. Critical analysis of physical education extra-curricular activities from the standpoint of objectives and contributions to the general welfare of the participants; value of the activities in the school and community; relationship to the physical education program; problems associated with the organization and administration of the program. Miss Blakemore
213. ADMINISTRATION OF ATHLETICS. S. 3 hr. PR: Experience in coaching and administration. The course is designed for persons engaged in actual coaching and administration. A study of the problems associated with the organization and administration of interscholastic and intercollegiate athletic programs and their relationship to physical education. Mr. Barnette and Mr. Duncan
215. RHYTHMS AND DANCE. II, S. 3 hr. PR: Consent. Principles of movement, materials, and practicum in dance. Miss Hurst
219. MODERN DANCE TECHNIQUES AND COMPOSITION. I, S. 3 hr. PR: Phys. Educ. 35 and 36 or consent. Application of scientific principles of movement; basic principles of music as related to dance movement; choreographic principles; practicum in dance movement. Principles for teaching the dance and problems involved in planning programs. Miss Carruth

275. PRINCIPLES AND PRACTICES OF ADOPTED PHYSICAL EDUCATION. I, S. 2 hr. PR: Zool. 171, Phys. Educ. 175, or equiv. Principles and philosophy in building an adapted program, types of injuries, classification of students, and application of adapted exercises. Mr. Yost
278. ADMINISTRATION OF PHYSICAL EDUCATION. II, S. 3 hr. PR: Phys. Educ. 71, 177. Modern theories in physical education and guiding principles in organization and administration of the program. Mr. Duncan
292. PHYSICAL EDUCATION IN THE ELEMENTARY SCHOOL. I, S. 3 hr. PR: Teaching experience or consent. Philosophy, objectives, activities, equipment, utilization of space, program planning, and evaluation for a functional program in elementary school physical education. Mr. Tork
294. PHILOSOPHY OF PHYSICAL EDUCATION. I, II, S. 3 hr. PR: Phys. Educ. 177 and 278 or equiv. and consent. Study of the place of physical education in education and modern living; philosophic processes in physical education; critical analysis of various problems confronting the physical educator. Miss Carruth
295. RESIDENCE IN CORRECTIVE THERAPY. S. 6 hr. PR: Phys. Educ. 175, 176, and selected psychology courses. An intensive 6-weeks course offered during the Summer under the auspices of the professional staff of a hospital. The course consists of 240 clock hours of staff lectures and practical clinical experience in corrective therapy as it is integrated in the Physical Medicine and Rehabilitation Program of a hospital. Mr. Yost and Staff of Supervising Hospital
319. HISTORY OF PHILOSOPHY OF THE DANCE. II, S. 3 hr. PR: Phys. Educ. 219 or equiv. A cultural survey of the dance as an expression of the society it represents; philosophy of the dance; the relation of dance to other art forms; dance as an educational experience and the study of the works of the outstanding artists of today. Miss Carruth
380. CURRICULUM DEVELOPMENT IN PHYSICAL EDUCATION. S. 3 hr. PR: Phys. Educ. 294. Application of growth and development of various age groups to program planning in physical education; evaluation of activities; formulation of criteria as a basis for curriculum revision to meet changing needs in the school program. (Limited to major students.) Miss Carruth
394. SEMINAR IN PHYSICAL EDUCATION. I, II, S. 4 hr. Phys. Educ. 294. An overview and critical analysis of the literature and research in physical education. Miss Carruth, Mr. Holter and Mr. Yost
397. INDIVIDUAL RESEARCH PROBLEMS IN PHYSICAL EDUCATION. I, II, S. 1-4 hr. PR: Phys. Educ. 294, and HPERS 375 or 395; or Educ. 301. Opportunity for independent study and investigation of pertinent problems. For advanced students with practical experience. Miss Carruth, Mr. Holter, and Mr. Yost
398. PRACTICUM IN PHYSICAL EDUCATION. I, II, S. 4 hr. PR: Phys. Educ. 394, and HPERS 396 and 397. Program planning, curriculum development, and job functions in physical education. Miss Carruth, Mr. Holter, and Mr. Yost

RECREATION

202. PHILOSOPHY OF RECREATION. II. S. 3 hr. PR: Major students in Recreation, graduate students in Education and Physical Education; or consent. Interpretation of recreation as a basic part of the living process; importance to individual community, and national welfare; social and economic significance. Mr. Scherlacher
204. RECREATION HOBBIES. I, S. 2 hr. PR: Rec. 1 or equiv. Lecture and workshop. Value of hobbies to youth and adults; participation in various types of hobbies; methods of organization and presentation; nature and scope. Mr. Hutchison
206. SOCIAL RECREATION FOR SCHOOL-AGE GROUPS. II, S. 3 hr. PR: 12 hr. in Education or consent. Workshop course. Planning and conduct of social activities, parties, picnics, special events and other recreation experience adapted to home, church, school, and community. Mr. Hutchison

265. LEISURE AND RECREATION. I, S. 3 hr. PR: Physical Education and Recreation majors or 14 hr. in Education or consent. Study of leisure as a social phenomenon in our modern culture and its implications for recreation.
Mr. Scherlacher
271. ADMINISTRATION OF CAMPS AND PREPARATION OF CAMP COUNSELORS. II, S. 3 hr. PR: Rec. 11 or equiv., or consent. Principles involved in modern camping programs, methods of organization and administration of camps.
Mr. Hutchison
282. ADMINISTRATION OF RECREATION. I, S. 3 hr. PR: Major in Recreation, graduate status in Education or Physical Education, or consent. General principles of administration; organization of staff administrative procedures. Study of enabling laws, legal responsibilities, surveys, finance, programs, facilities, and public relations.
Mr. Scherlacher
294. RECREATION LEADERSHIP IN GROUPS. II, S. 2 hr. PR: 5 hr. general and educational psychology, or at least 1 year of leadership experience with teen-age children, or consent. For those working in voluntary agencies such as Y.M.C.A. Boy Scouts, Girl Scouts, etc. Also for those responsible for special-interest groups in extracurricular activities.
Mr. Scherlacher
295. LEADERSHIP IN NATURE RECREATION. II, S. 2 hr. PR: 5 hr. in biology, botany, or zoology, or combination; Rec. 1, 3, or equiv.; and at least 1 year of leadership experience with teen-age children. For recreation leaders, camp counselors, and teachers who work with school-age children in camps or in special interest groups.
Mr. Scherlacher
296. AMERICAN FOLK DANCE. I, S. 3 hr. PR: Phys. Educ. 132 or equiv. Study of American Square, contra, circle, and round dances and play party games, and their place in community and school recreation programs. Their origin and relationship to the arts and other aspects of American culture. Analysis of techniques in leading and calling.
Mr. Scherlacher
305. HUMAN INTEREST AREAS IN RECREATION PLANNING. I, II, S. 3 hr. PR: Rec. 202 or 20 hr. in Education or equiv. Exploration of the human interest areas which are the sources of recreation program content. Their adaptation to school and municipal recreation program planning.
Mr. Scherlacher and Visiting Instructors
306. LEADERSHIP IN SCHOOL-AGE RECREATION PROGRAMS. II, S. 2 hr. PR: Rec. 107 or 2 years' teaching experience. Leadership techniques used in various recreation activities of school-age groups. Analysis of differences between teaching and recreation leadership.
Mr. Hutchison
307. COMMUNITY RECREATION. I, S. 3 hr. PR: Rec. 202 or consent. A study of problems related to the provision of adequate recreation service for a community. Standards and quality of recreation service; methods of measuring existing services and their coordination; and community organization procedures. Course is designed for leaders in voluntary agencies, schools, churches, and municipal recreation organizations.
Mr. Scherlacher and Visiting Instructors
394. SEMINAR IN RECREATION. I, II, S. 4 hr. PR: Rec. 202. An overview and critical analysis of the literature and research in recreation.
Mr. Scherlacher
397. INDIVIDUAL RESEARCH PROBLEMS IN RECREATION. I, II, S. 1-4 hr. PR: Rec. 202, HPERS 375 or 395, or Educ. 301. Opportunity for independent study and investigation of pertinent problems. For advanced students with practical experience.
Mr. Scherlacher
398. PRACTICUM IN RECREATION. I, II, S. 4 hr. PR: Rec. 394, HPERS 396 and 397. Program planning, curriculum development, and job functions in recreation.
Mr. Scherlacher

SAFETY EDUCATION

280. PROGRAMS IN SAFETY EDUCATION. I, II, S. 3 hr. PR: Consent. Materials and methods in total school program. Organization and administration of

instruction in safe living in school, home, travel, industry, physical education, athletics, and recreation. Mr. Yost

281. DRIVER AND TRAFFIC SAFETY EDUCATION PROGRAMS. II, S., 3 hr. PR: Safety Educ. 280 or equiv. or 20 hours of Education. Philosophy, objectives, new and advanced equipment, methods and materials in driver and traffic safety education; program planning, and evaluative techniques in schools and adult programs. Includes laboratory with various methods, materials, and instructional techniques. Mr. Maurice
282. PROBLEMS IN DRIVER AND TRAFFIC SAFETY EDUCATION. I, II, S. 3 hr. PR: Safety Educ. 281 or equiv. or teaching experience in driver education. A course designed for pre-service and in-service teachers of driver education and traffic safety; individual and group problems considered. Examination of existing courses of study, research, and supervisory and evaluative practices. Mr. Maurice
283. PHILOSOPHY OF SAFETY EDUCATION. I, II, S. 3 hr. PR: Safety Educ. 181, 182, or 20 hr. of Education. Study of the place of safety education in modern living; philosophies of safety education as expounded by leaders in the field; emphasis on accident causation and accident prevention in various areas of safety; and research implications. Mr. Yost
365. ORGANIZATION, ADMINISTRATION, AND SUPERVISION OF SCHOOL SAFETY EDUCATION. I, II, S. 3 hr. PR: 14 hr. of Education or Safety Educ. 280 or 283 or equiv., and consent. Designed for teachers, school administrators, college instructors, and others responsible for directing or supervising safety programs in the school. Deals with the problems, policies, practices, and procedures involved in the organization, administration, and supervision of a comprehensive accident prevention and safety education program for the school. Considers integration factors of the School Safety Program with the Community Safety Program. Mr. Yost
394. SEMINAR IN SAFETY EDUCATION. I, II, S. 4 hr. PR: Safety Educ. 283. An overview and critical analysis of the literature and research in safety education. Mr. Yost
397. INDIVIDUAL RESEARCH PROBLEMS IN SAFETY EDUCATION. I, II, S. 1-4 hr. PR: Safety Educ. 283, HPERS 375 or 395, or Educ. 301. Opportunity for independent study and investigation of pertinent problems. For advanced students with practical experience. Mr. Yost
398. PRACTICUM IN SAFETY EDUCATION. I, II, S. 4 hr. PR: Safety Educ. 394, and HPERS 396 and 397. Program planning, curriculum development, and job functions in safety education. Mr. Yost

HPERS

HPERS courses involve all areas—Health Education, Physical Education, Recreation, and Safety Education.

200. WORKSHOP. S. 1-6 hr.
I—Health Education.
II—Physical Education.
III—Recreation.
IV—Safety Education. Staff
201. SEMINAR OF FOREIGN PROGRAMS IN HEALTH, PHYSICAL EDUCATION, RECREATION, AND SAFETY. S. 2-6 hr. PR: Consent. Study of health, physical education, recreation, athletics, and safety programs as they exist in the countries visited will be made in terms of philosophy, program content, facilities, administration. This course is designed for administrators and teachers. Staff
301. THE ROLE OF THE SCHOOL ADMINISTRATOR IN CONDUCTING PROGRAMS IN HEALTH, PHYSICAL EDUCATION, RECREATION, AND SAFETY. S. 2 hr. PR: 20 hr. in Education. A seminar for school administrators on the solution of problems associated with planning, scheduling and conducting school pro-

grams in health, physical education, recreation, and safety. Consideration is given to program, activity, leadership, facilities, supplies, equipment, finances, and supervision. (Not open to major students.) Mr. Duncan

350. MEASUREMENT IN HEALTH, PHYSICAL EDUCATION, AND SAFETY. II, S. 3 hr. PR: Health Educ. 205 or Phys. Educ. 294 or Safety Educ. 283. An analysis of the construction and use of typical tests in Health Education, Physical Education, and Safety Education with basic statistical interpretations. Mr. Holter
352. STATISTICAL ANALYSIS IN HEALTH, PHYSICAL EDUCATION, RECREATION, AND SAFETY. II, S. 3 hr. PR: HPERS 350. A critical statistical analysis of measurement and evaluation in Health, Physical Education, Recreation, and Safety Education programming and research. Mr. Holter
355. PROBLEMS IN HEALTH, PHYSICAL EDUCATION, RECREATION, AND SAFETY. I, S. 3 hr. PR: Health Educ. 205 or Phys. Educ. 294 or Rec. 202 or Safety Educ. 283. Content and relationships among physical education, health education, recreation, and safety programs. Aims to develop critical analysis. Follows seminar procedure and presupposes broad academic experience on part of the student. Mr. Holter
375. INTRODUCTION TO RESEARCH. II, S. 3 hr. PR: Health Educ. 205 or Phys. Educ. 294 or Rec. 202 or Safety Educ. 283. An analysis of the nature and purpose of research with an emphasis upon types and techniques applicable to the areas of Health, Physical Education, Recreation, and Safety. (Required of all Master of Science Degree candidates). Miss Carruth, Messrs. Holter and Yost
395. RESEARCH SEMINAR. II, S. 3 hr. PR: Health Educ. 394 or Phys. Educ. 394 or Rec. 394. or Safety Educ. 394, and HPERS 375 or Educ. 301. Analysis of research design, compilation, organization, treatment and interpretation of data for research projects in Health, Physical Education, Recreation, and Safety. (Required of all candidates for the Doctoral Degree). Miss Carruth, Messrs. Holter and Yost
396. ADMINISTRATIVE POLICIES. I, II, S. 3 hr. PR: Health Educ. 394 or Phys. Educ. 394 or Rec. 394 or Safety Educ. 394, and Educ. 339 or Educ. 340. A study and evaluation of administrative policies and practices in health education, physical education, recreation, safety education, and athletics. Mr. Duncan
397. SUPERVISION. I, II, S. 3 hr. PR: HPERS 396 and Educ. 335 or Educ. 336 or Educ. 341. Mr. Duncan
399. THESIS. I, II, S. 6 hr. PR: HPERS 375 or 395. Staff

REHABILITATION COUNSELING

The Inter-Departmental Graduate Program in Rehabilitation Counseling is designed to prepare counselors with professional skills to help disabled persons to obtain optimal satisfactions in living, including adjustment physically, mentally, emotionally, and vocationally.

This program is designed to prepare the rehabilitation counselor to practice competently in public and private rehabilitation agencies, rehabilitation centers, sheltered workshops, hospitals, and other facilities whose services are designed primarily to serve the disabled. The program prepares the counselor to contribute effectively as a member of an interprofessional team through his understanding of human behavior, his knowledge and use of evaluative techniques, his knowledge of individuals in relation to employment opportunities and practices, and his use of skills in coordinating services to meet the needs of handicapped persons.

The departments of Psychology and Social Work in the College of Arts and Sciences, and the Department of Guidance in the College of Education, contribute courses in an inter-disciplinary and inter-departmental approach, under Administrative and Policy Committees composed of the Department Chairmen, the Deans of the two colleges, and the Program Coordinator.

SCHOLARSHIPS AND EDUCATIONAL STIPENDS

For graduate students in Rehabilitation Counseling a limited number of financial grants are available. These amount to \$1,800 plus tuition for the first year of graduate study, and \$2,000 plus tuition for the second year. Inquiries concerning financial assistance should be made to the Program Coordinator.

REQUIREMENTS FOR ADMISSION

The applicant must meet admission requirements of the Graduate School and the Program Admission Committee. The applicants must bring a broad liberal arts training including no fewer than 24 semester hours, or the equivalent, in economics education, history, philosophy, political science, pre-social work, psychology, or sociology. There must be a concentration of at least 12 semester hours in one of these fields.

REQUIREMENTS FOR COMPLETION

1. Completion of an approved program totaling not fewer than 42 semester hours. In most cases the program will range between 42 and 48 hours.

2. Completion of 10 to 12 semester hours of supervised field work (internship) under faculty direction in a rehabilitation setting.

3. Demonstration of competence in the theory and practice of rehabilitation counseling.

The degree will not be awarded solely for credits earned. A thesis is not required.

CURRICULUM

The minimum curriculum in each area is set out below, allowing flexibility for adaptation to student backgrounds. Courses may be selected by the student with the consent of the adviser.

- | | <i>Hr.</i> |
|---|------------|
| 1. <i>Counseling:</i> (Minimum: 6 sem. hours) | |
| Educ. 376—Counseling Techniques | 2 |
| Educ. 377—Special Counseling Problems | 3 |
| Psych. 314—Practicum in Industrial Interviewing | 3 |
| Psych. 316—Counseling and Psychotherapy | 3 |
| Psych. 351—Practicum in Student Personnel Psych., or | |
| Psych. 252—Practicum in Vocational Appraisal | 1-3 |
| Soc. Work 301—Casework I | 3 |
| Soc. Work 358—Casework II for Rehabilitation Counselors | 3 |
| 2. <i>Evaluative Techniques:</i> (Minimum: 5 sem. hours) | |
| Educ. 375—Individual Inventory Techniques | 2 |
| Psych. 225—Group Psychometric Testing | 3 |
| Psych. 324—Individual Intelligence Testing | 4 |
| Educ. 324—Individual Intelligence Testing | 4 |
| 3. <i>Occupational Information:</i> (Minimum: 2 sem. hours) | |
| Psych. 124—Job Analysis | 3 |
| 4. <i>Dynamics of Human Behavior:</i> (Minimum: 6 sem. hours) | |
| Educ. 378—Advanced Studies of Human Adjustment | 2 |
| Psych. 218—Psychology of Personality | 3 |
| Psych. 236—Psychology of Adjustment | 3 |
| Psych. 238—Introduction to Clinical Psychology | 2 |
| Soc. Work 315—Psychosocial Development of Individual | 2 |
| Soc. Work 320—Psychopathology | 2 |
| Soc. Work 371—Health, Disease, and Disability | 2 |
| Sociol. 244—Culture and Personality | 3 |

5. *Community Organization*: (Minimum: 3 sem. hours)

Soc. Work 304—Community Organization	3
Sociol. 208—The Community	3
Soc. Work 212—Com. Soc. Welfare Resources	3
 6. *Rehabilitation Counseling*: (Minimum: 13 sem. hours)
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370. SEMINAR IN MEDICAL-VOCATIONAL ASPECTS. I. 2 hr. PR: 21 hr. in social sciences or education. Contribution of medicine in the rehabilitation process from referral to vocational placement of the handicapped person. Mr. Downes
 384. SEMINAR IN PERSONNEL-VOCATIONAL COUNSELING ASPECTS. II. 3 hr. PR: 21 hr. in social sciences or education. Occupational information dealing with principles of preparation and placement of handicapped persons into employment. Mr. Downes
 386. PROBLEMS AND WORKSHOPS. I, S. 1-3 hr. Rehabilitation in theory and techniques in problems in blindness, epilepsy, and mental retardation. Course also provides for concentrated study in special institutes, such as orientation of new vocational rehabilitation personnel. Mr. Downes
 387. FIELD WORK TRAINING. I, II, S. 1-2 hr. PR: Consent, following at least one academic semester in classroom. Field practice (internship) in selected agencies, rehabilitation centers, clinics, or hospitals in a rehabilitation setting conducting an organized program of services for the mentally or physically handicapped. Such practice will be under the direct supervision of faculty and agency personnel. Variable credit: minimum of 50 clock hours per semester hour of credit. Mr. Brown and Mr. Downes
 388. INTRODUCTION TO VOCATIONAL REHABILITATION. I. 3 hr. A study of problems and extent of disablement, historical development and legal basis, concepts, processes, and case development techniques in vocational rehabilitation as a public service to the mentally and physically handicapped. Mr. Brown
 389. NON-CASEWORK ASPECTS. I, II, S. 1 hr. PR: Minimum of 5 sem. hr. of field work training. Course is designed to provide post-field work opportunity to clarify concepts, and processes, in light of field training experiences. Non-casework responsibilities of counselors are covered. Mr. Brown
 390. COUNSELING PRACTICUM. I, II, S. 3 hr. PR: Graduate standing and consent. Counseling techniques dealing with the theory and practice of rehabilitation counseling. Mr. Brown and Mr. Downes

Elective hours may be selected from the departmental offerings above, or upon recommendation of the adviser, from economics, genetics, management, nursing education, political science, sociology, speech, and others.

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BEQUESTS FOR WEST VIRGINIA UNIVERSITY

SUGGESTED FORMS

Inquiries concerning bequests or other gifts to The Board of Governors of West Virginia University, or to The West Virginia University Foundation, Incorporated, should be addressed to the Office of the President, West Virginia University, Administration Building, Morgantown, West Virginia.

The following are suggested as appropriate forms for bequests to The Board of Governors of West Virginia University:

General

I give and bequeath to THE BOARD OF GOVERNORS OF WEST VIRGINIA UNIVERSITY, a corporation existing under the laws of the State of West Virginia, the sum of Dollars to be used for the general purposes of The University at the discretion of The Board of Governors.

Specific

I give and bequeath to THE BOARD OF GOVERNORS OF WEST VIRGINIA UNIVERSITY, a corporation existing under the laws of the State of West Virginia, the sum of Dollars and direct that the income therefrom shall be used for the following purpose or purposes:

(Here specify in detail the purpose or purposes.)

The following are suggested as appropriate forms for bequests to The West Virginia University Foundation, Incorporated:

General

I give and bequeath to THE WEST VIRGINIA UNIVERSITY FOUNDATION, INCORPORATED, a corporation existing under the laws of the State of West Virginia, the sum of Dollars to be used for general purposes of The University at the discretion of the Foundation.

Specific

I give and bequeath to THE WEST VIRGINIA UNIVERSITY FOUNDATION, INCORPORATED, a corporation existing under the laws of the State of West Virginia, the sum of Dollars and direct that the income therefrom shall be used only for the following purpose or purposes:

(Here specify in detail the purpose or purposes.)

